TATLAWIKSUK RIVER WEIR SALMON STUDIES, 2003

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OEO/ADA STATEMENT

REPORT SUMMARY PAGE

Title: Tatlawiksuk River Weir Salmon Studies, 2003

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Investigator(s)/Affiliation(s): Dave Cannon, Kuskokwim Native Association; John C. Linderman, Jr., Douglas B. Molyneaux, Alaska Department of Fish and Game, Commercial Fisheries Division.

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   - Determine the distribution and abundance of salmon and other fishes in the Kuskokwim River.
   - Identify spawning salmon populations and their run sizes in the Kuskokwim River watershed
2. Fisheries Monitoring
   - Assess impact of regulation changes (e.g., mesh size restrictions and subsistence fishing schedule) on size and sex of harvested fish and overall quality of escapement.

Study Cost: The U.S. Fish and Wildlife Service, Office of Subsistence Management provided $87,145 in funding support for this project to the Kuskokwim Native Association and the Alaska Department of Fish and Game under agreement # FIS 00-007. Additional operational funds and in-kind services are provided through the Alaska Department of Fish and Game, the National Oceanic and Atmospheric Administration (Alaska Fishery Disaster Relief Program, # NA 96FM0196), and the Bering Sea Fishermen's Association (#E00441023).

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Key Words: chinook salmon, *Oncorhynchus tshawytscha*, chum salmon, *O. keta*, coho salmon, *O. kisutch*, escapement, age-sex-length, Tatlawiksuk River, Kuskokwim River, resistance board weir, mark-recapture, radiotelemetry, longnose suckers, *Catostomus catostomus*

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Tatlawiksuk River, salmon escapement monitor program is a cooperative project operated jointly by the Kuskokwim Native Association (KNA) and the Commercial Fisheries Division of the Alaska Department of Fish and Game (ADF&G). The U.S. Fish and Wildlife Service (USFWS), Office of Subsistence Management provided $87,145 in funding support to KNA and ADF&G for this project through the fisheries Resource Monitoring Program under agreement # FIS 00-007. Since inception of the project in 1998, operational funds have been provided to KNA from a number of sources including grants from the National Fish and Wildlife Foundation (# 1998-0241), and a grant from the U.S. Bureau of Indian Affairs that is administered by the Bering Sea Fishermen's Association (#E00441023). Additional funding for ADF&G's participation in this project was through a combination of state general funds, a grant from the Western Alaska Fishery Disaster Relief Program (NA 96FM0196) under National Oceanic and Atmospheric Administration (NOAA), and the U.S. Fish and Wildlife Service (USFWS), Office of Subsistence Management, Resource Monitoring Program agreement # FIS 01-117 which supported salmon age-sex-length aging and data analysis. In addition, other groups such as Kuskokwim Corporation and Sport Fish Division of ADF&G provided in-kind support to the project in the form of land-use authorization for the camp, and facilities for weir fabrication and welding services.

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TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

Page

LIST OF TABLES

LIST OF FIGURES

Figure **Page**

LIST OF APPENDICES

ABSTRACT

Tatlawiksuk River salmon escapements were monitored in 2003 using a resistance board weir. The project target operational period is 15 June through 20 September; however, the weir washed out on 4 July during a high water event, prematurely terminating operations. Total chinook salmon escapement was determined to be 1,683 fish based on a proportional estimate using radio tagged chinook salmon passage data. A total of 479 chum salmon were observed passing upstream through the weir before 3 July, but premature termination of the project precluded estimates of total chum salmon escapement. No coho salmon were observed during the operational period of the project in 2003. Samples collected before 3 July were inadequate for generating age-sex-length composition estimates of escapement, but suggest trends similar to age-sex-length trends in previous years at Tatlawiksuk River, and to age-sex-length trends at other Kuskokwim River escapement projects. Premature termination of the project resulted in inadequate mark-recapture data for generating travel time, swim speed, and in-river run timing estimates of Tatlawiksuk River chum and coho salmon populations.

KEY WORDS: chinook salmon, *Oncorhynchus tshawytscha*, chum salmon, *O. keta*, coho salmon, *O. kisutch*, escapement, age-sex-length, Tatlawiksuk River, Kuskokwim River, resistance board weir, radiotelemetry, mark-recapture, longnose suckers, *Catostomus catostomus*

INTRODUCTION

Kuskokwim River drains an area approximately 50,000 square miles, or 11 percent of the total area of Alaska (Figure 1; Brown 1983). Each year mature salmon *Oncorhynchus spp.* return to the river and support intensive subsistence and commercial fisheries that have annually harvested about a million salmon between 1980 and 1997 (Ward et al. 2003). The subsistence fishery is a vital cultural component for most Kuskokwim Area residents, and subsistence salmon harvest contributes substantially to the regional food base (Coffing 1991, Coffing 1997a, Coffing 1997b, Coffing et al. 2000). The commercial salmon fishery in the Kuskokwim Area, though modest in value compared to other areas of Alaska, has been an important component of the market economy of lower river communities (Buklis 1999, Ward et al. 2003).

Salmon that contribute to these fisheries spawn and rear in nearly every tributary of the Kuskokwim River basin; however, few spawning streams receive rigorous salmon escapement monitoring. Limited escapement data available for the Kuskokwim River inhibits the ability of management authorities to assess the adequacy of escapements and the effectiveness of management decisions. Tatlawiksuk River weir is one of several initiatives begun in the late 1990s to help address this data gap. The need to address this information gap became even more evident in September 2000 when the Alaska Board of Fisheries (BOF) classified both Kuskokwim River chinook *Oncorhynchus tshawytscha* and chum salmon *O. keta* as “stocks of concern” because of the chronic inability of managers to maintain expected harvest levels (5 AAC 39.222; Burkey et al. 2000a, Burkey et al. 2000b).

Historically, only two long-term ground-based escapement-monitoring projects have operated in the Kuskokwim River basin; the Kogrukluk River weir (1976 to present, Shelden et al. 2004) and Aniak River sonar (1980 to present, Sandall *In press*). These tributaries constitute a modest fraction of the total Kuskokwim River basin, and salmon populations in them are not representative of the diversity of salmon populations that contribute to subsistence, commercial, and sport harvests, or do not take into account the overall ecosystem function in the Kuskokwim drainage. Other ground-based escapement monitoring projects have been developed within the Kuskokwim River basin, but these initiatives were short-lived (Ward et al. 2003). Inception of the Tatlawiksuk River weir in 1998, coupled with other initiatives begun in the late 1990s and beyond (i.e. Stuby 2003, Chythlook and Evenson 2003, Kerkvliet et al. 2003, Gilk and Molyneaux *In press*) provides some of the additional escapement monitoring and abundance estimates required for sustainable salmon management (e.g. Holmes and Burtkett 1996, Mundy 1998).

Aerial stream surveys are periodically conducted on many tributaries using fixed-wing aircraft, but these surveys serve as abundance indices because they are flown only once each season (Appendix A.1; Ward et al. 2003). The distribution of survey streams is geographically skewed toward the lower Kuskokwim River basin because aerial surveys are restricted to clear water streams or lakes; tributaries in the middle and upper Kuskokwim River are oftentimes stained from organics or clouded by glacier silt, which hinder visibility. Escapement assessment through aerial surveys is also subject to a high degree of variability dependent on viewing conditions and the person doing the surveys (Ward et al. 2003).

The goal of salmon management is to provide for long-term sustainable fisheries by ensuring adequate numbers of salmon escape onto the spawning grounds each year. Since 1960, management of the Kuskokwim River subsistence, commercial and sport fisheries has been the responsibility of the Alaska Department of Fish and Game (ADF&G). Management authority for the subsistence fishery was broadened in October 1999 to include the federal government under Title VIII of the Alaska National Interest Lands Conservation Act (ANILCA), and the U.S. Fish and Wildlife Service (USFWS) is the federal agency most involved within the Kuskokwim Area. In addition, tribal groups such as the Kuskokwim Native Association (KNA) are charged by their constituency to actively promote a healthy and sustainable subsistence salmon fishery. These and other groups have combined their resources to develop several new projects, including the Tatlawiksuk River weir, to better achieve the common goal of providing for long-term sustainability of salmon fisheries in the Kuskokwim River.

Sustainable salmon fisheries require more than just adequate escapement numbers. Escapement projects, such as Tatlawiksuk River weir, commonly serve as platforms for collecting other types of information useful for management and research. Collection of age-sex-length (ASL) data is typically included in most escapement monitoring projects, and Tatlawiksuk River weir is no exception (e.g., Estensen 2002, Zabkar and Harper *In press*, Roettiger et al. *In press.*, Shelden et al. 2004). Knowledge of ASL composition can provide insights into understanding fluctuations in salmon abundance and is used for developing spawner-recruit relationships used in formulating escapement goals (DuBois and Molyneaux 2000). Tatlawiksuk River weir also serves as a platform for collecting other types of information useful for management and research. Water temperature, water chemistry and stream discharge are fundamental variables of the stream environment that directly or indirectly influence salmon productivity and timing of salmon migrations (Hauer and Hill 1996, Kruse 1998). Since these variables can be affected by human activities (i.e., mining, timber harvesting, man-made impoundments, etc.; NRC 1996) or climatic changes (e.g., El Nino and La Nina events), data collection for such variables are included in the project operational plan.

Objectives

1. Determine daily and total escapements of chinook, chum and coho salmon from 15 June through 20 September.

2. Estimate ASL composition of total chinook, chum and coho salmon escapements from a minimum of three pulse samples, one collected from each third of the run, such that 95 percent simultaneous confidence intervals for each pulse are no wider than 0.20 ($\alpha = 0.05$ and $d = 0.10$).

3. Profile habitat variables of the Tatlawiksuk River: daily water temperature, water level, and water chemistry.

4. Recover tag numbers and associated information from chum, sockeye and coho salmon in support of the mark-recapture study conducted on mainstem Kuskokwim River.

5. Serve as a monitoring site for chinook salmon equipped with radio telemetry transmitters deployed as part of a mark-recapture study conducted on mainstem Kuskokwim River.

METHODS

Study Site

Tatlawiksuk River is a tributary of the middle Kuskokwim River basin and provides spawning and rearing habitat for chinook, chum and coho salmon (ADF&G 1998). Small numbers of sockeye *O. nerka* and pink *O. gorbuscha* salmon also migrate in the river. Tatlawiksuk River originates in the foothills of the Alaska Range (Figure 2; Brown 1983). It flows southwesterly for 70 miles, draining an area of approximately 813 square miles before joining Kuskokwim River at river mile (rm) 383 (river kilometer (rkm) 616). Throughout most of the river's course it meanders across wide, flat valleys vegetated with white spruce and scattered birch or aspen. Black spruce is more characteristic in poorly drained areas of the basin, and dense stands of willow and alder occur on sand and gravel bars. Unnamed streams that join the Tatlawiksuk River from the southeast and northeast drain extensive bog flats and swampy lowlands in the lower reaches of the basin. The channel gradient of the lower fifty miles is approximately eight feet per mile.

Local residents report Athabaskan groups once harvested salmon from Tatlawiksuk River using fish fences and traps into the mid 1900s (Andrew Gusty Sr., Stony River, personal communication). Since 1968, biologists from ADF&G periodically observed salmon escapements in mainstem Tatlawiksuk River by means of aerial surveys coincidental with peak chinook and chum salmon spawning activity (Appendix A.2; Schneiderhan 1983, Burkey and Salomone 1999).

Senka's Landing is located on the mainstem of the Kuskokwim River, approximately 7 miles downstream from the mouth of Tatlawiksuk River. Senka's Landing is the homestead of the Gregory family, with five permanent residents living at the homestead. The Gregory's periodically sell gasoline for retail, and allow camp equipment used at the weir project to be stored over the winter. Senka's Landing does not have telephone service, but the Gregorys can be contacted through the bush message service offered by KSKO radio in McGrath.

Approximately nine miles farther downstream, tucked among several islands, is the community of Stony River, population 43 (Williams 2000). This town does not have a grocery store, but gasoline can be purchased; however, availability is limited and unreliable. Several small air taxi carriers service Stony River from Aniak through scheduled stops six days a week.

Weir Design and Maintenance

Weir Design

A weir has been used to enumerate salmon escapements in the Tatlawiksuk River since 1998 (Linderman et al. 2002). The original fixed weir design was replaced with a resistance board weir in 1999. The weir used in 2002 spanned the 220 ft wide channel, except for ten feet on either side where fixed-panel sections were used. The width of the resistance board panels was 36-in and picket spacing was 1¼-in (gap between pickets). Narrow picket spacing allowed for complete census of all but the smallest returning salmon, while small resident species were able to pass between pickets. Linderman et al. (2002) and Stewart (2002) described modifications in weir design implemented since 1998.

Facilitating Upstream Fish Passage

The resistance board weir utilized four methods to facilitate upstream fish passage; additional details of these methods are described in Linderman et al. (2003b). The first method utilized a passage chute in combination with a fish trap. The trap acted as a holding pen for collecting fish used in biological sampling, and as a platform for enumerating fish passage. The second method utilized an enclosed passage chute used exclusively for enumerating fish passage. The third method utilized modified resistance board weir panels termed "counting panels", which allowed fish to be enumerated as they passed through openings between panel pickets. The fourth method consisted of removing a panel from the weir, creating a temporary breach for fish to be enumerated through.

Facilitating Downstream Fish Passage

For various reasons, fish sometimes migrated downstream and required an avenue for safe passage over the weir. This behavior was especially common among longnose suckers *Catostomus catostomus* in late summer. The resistance board weir provided an effective means of accommodating downstream fish passage through incorporation of downstream passage chutes. Each chute consisted of a single panel set to allow some water to flow over the distal end of the panel. Details of the downstream passage chutes are described in Linderman et al. (2002). Several of these chutes were incorporated along the length of the weir. Fish do not typically pass upstream over these chutes, and they are set only during periods of active downstream fish migration. Downstream passage chutes were not used during periods of strong upstream salmon passage.

Facilitating Boat Passage

Boats passed the weir at a designated 'boat gate' which consisted of specially designed panels located near the thalweg (Linderman et al. 2002). Boat operators were able to pass with little or no involvement by the weir crew as the weight of a boat submerged the passage panels and allowed boats to pass over the weir. The panels would resurface once the boat cleared the weir. Boats with jet-drive engines were most common and could pass upstream and downstream over the boat gate after reducing their speed to 5 miles per hour or less. However, operators of boats with propeller-drive engines had to use a towrope when passing upstream, and turn off their engines and tilt their motors when passing downstream (Linderman et al. 2002).

Weir Cleaning and Inspection

The weir was cleaned several times each day, typically at the beginning and end of counting shifts. A technician walked across the weir to partially submerge each panel, thereby allowing the current to wash any debris downstream. A rake was used to push larger debris loads off the weir. Each time the weir was cleaned, a visual inspection was made of the weir panels, substrate rail, fish trap, and fixed weir sections to ensure no breaches would allow fish to pass upstream unobserved. If conditions prevented an adequate visual inspection, technicians used snorkel gear to ensure there were no breaches in the weir.

Fish Passage and Escapement

The target operational period for counting fish was 15 June through 20 September, spanning the most of the salmon runs. The term "total escapement" used in this report refers to the cumulative escapement of a given species during the target operational period. Total escapement may consist of observed passage and estimated passage, the later applied to days when the weir was partially or totally inoperable. Inoperable periods may have been the result of interruptions in operations, a delayed start date or premature end date. Counts of non-salmon species were only reported as observed passage.

Observed Fish Passage

All fish observed passing upstream through the weir were enumerated by species. Daily enumeration typically began by 0800 hours, and typically ended by 1200 hours depending on hourly abundance. The most commonly used procedures consisted of a crewmember positioned above the fish gate or exit gate to enumerate passage with a zeroed multiple tally counter. Crewmembers were positioned with the best view of fish passage when utilizing counting panels or a removed weir panel, and enumerated fish with a zeroed multiple tally counter. Counting continued for a minimum of one hour, or until passage waned to near zero, then the passage location was closed. The crewmember recorded fish passage in a designated notebook and zeroed the tally counter for the next count. This procedure was repeated several times each day, even when passage numbers were low. At the end of each day, daily and cumulative counts were copied to logbook forms. Details of the logbook and forms can be found in Linderman et al. (2003b).

Estimated Fish Passage

Passage estimates were not made if the available data were insufficient to generate a reasonable estimate of unobserved passage; otherwise, estimates were made using several methods. Estimates were assumed to be zero if passage was considered negligible based on historical data and run timing indicators. In 2003, the Kuskokwim River chinook salmon radio telemetry project (Stuby *In Press*) presented an opportunity for estimating chinook salmon passage during the 3 July through 20 September inoperable period at Tatlawiksuk River weir. A cumulative passage estimate was calculated from the cumulative passage of chinook salmon during the operational period and the proportion of radio tagged chinook salmon past the weir site before and after the inoperable period using the following formula:

$$N_T = \left(\frac{\left(n_{rt_1} \times N_{t_2} \right)}{n_{rt_2}} \right) \tag{1}$$

where:

N_T = cumulative passage estimate for the 3 July through 20 September inoperable period at Tatlawiksuk River weir (t_1);

n_{rt_1} = number of radio tagged chinook salmon past the weir site during the 3 July through 20 September inoperable period at Tatlawiksuk River weir (t_1);

N_{t_2} = cumulative chinook salmon passage for the 20 June through 2 July operational period at Tatlawiksuk River weir (t_2);

n_{rt_2} = number of radio tagged chinook salmon past the weir site during the 20 June through 2 July operational period at Tatlawiksuk River weir (t_2).

The cumulative estimate (N_T) was extrapolated into daily passage estimates using chinook salmon passage at another Kuskokwim River escapement project as a model data set. The model data set was chosen if evidence supporting similar fish passage characteristics existed between the tributaries in question. In this case, observed chinook salmon passage at Tatlawiksuk River weir in 2003 was most similar to chinook salmon run characteristics at Kwethluk River weir in 2003. Daily estimates were calculated by applying Kwethluk River daily passage proportions to the cumulative Tatlawiksuk River passage estimate using the following formula:

$$n_{Td_i} = \left(\frac{\left(n_{Kd_i} \times N_T \right)}{N_{Kt_1}} \right) - n_{p_i} \tag{2}$$

where:

n_{Td_i} = passage estimate for a given day (i) of the 3 July through 20 September inoperable period at Tatlawiksuk River weir (t_1);

n_{Kd_i} = daily passage at Kwethluk River weir for the i^{th} day of the 3 July through 20 September inoperable period at Tatlawiksuk River weir (t_1);

N_T = cumulative passage estimate for the 3 July through 20 September inoperable period at Tatlawiksuk River weir (t_1);

N_{Kt_1} = cumulative passage at Kwethluk River weir during the 3 July through 20 September inoperable period at Tatlawiksuk River weir (t_1);

n_{p_i} = Partial day observed passage at Tatlawiksuk River weir (if any) from the given day (i) being estimated.

Carcass Counts

Spawned out salmon and carcasses of dead salmon (both hereafter referred to as carcasses) that washed up on the weir, were counted by species and sexed, and passed downstream. At the end of each day, daily and cumulative carcass counts were copied to logbook forms. Details of the logbook and forms can be found in Linderman et al. (2003b).

ASL Composition of Escapement

ASL compositions of the total annual chinook, chum and coho salmon escapements were estimated by sampling a fraction of fish passage and applying the ASL composition of those samples to total escapement as described in DuBois and Molyneaux (2000).

Sample Collection

A pulse sampling design was used for chinook and chum salmon, in which intensive sampling was conducted for one to three days followed by a few days without sampling. The goal for each pulse was to collect samples from 210 chinook salmon and 200 chum salmon. These sample sizes were selected for simultaneous 95% confidence interval estimates of age composition proportions no wider than 0.20 (Bromaghin 1993). Minimum number of pulse samples was one per species from each third of the run.

The coho salmon sample design was modified from previous years to account for stability in ASL compositions over the duration of the coho salmon run. Pulse sample goals were replaced with a total run sample goal of 170 in 2003. The total run sample goal was divided between three pulse samples, each representing a third of the run.

Salmon were sampled from the fish trap installed in the weir. General practice was to open the entrance gate and leave the exit gate closed, which allowed fish to accumulate inside the holding pen. The holding pen was typically allowed to fill with fish and sampling was done during scheduled counting periods.

Scales were removed from the preferred area of the fish (INPFC 1963). A minimum of three scales were taken from each fish and mounted on numbered and labeled gum cards. Sex was determined by visually examining external morphology, keying on the development of the kype, roundness of the belly and the presence or absence of an ovipositor. Length was measured to the nearest millimeter from mid-eye to tail fork. After each fish was sampled, it was released into a recovery area upstream of the weir. After sampling was completed, relevant information such as sex, length, date, and location was copied from hardcopy forms to computer mark-sense forms. Further details of sampling procedures can be found in DuBois and Molyneaux (2000) and Linderman et al. (2003b). The completed gum cards and data forms were sent to the Bethel and Anchorage ADF&G offices for processing.

Weir crews conducted active sampling on chinook salmon to increase chinook salmon sample sizes. Active sampling consisted of capturing and sampling chinook salmon while actively passing and enumerating all fish. Further details of the active sampling procedures are described in Linderman et al. (2002).

Estimating ASL Composition

ADF&G staff in Bethel and Anchorage aged scales, processed the ASL data and generated data summaries (DuBois and Molyneaux 2000). These procedures generated two types of summary tables for each species; one described the age and sex composition and the other described length statistics. These summaries account for changes in the ASL composition throughout the season by first partitioning the season into temporal strata based on pulse sample dates, applying ASL composition of individual pulse samples to the corresponding temporal strata, and finally summing the strata to generate the estimated ASL composition for the season. This procedure ensured the ASL composition of the total escapement was weighted by abundance of fish in the escapement rather than the abundance of fish in the samples. Likewise, the estimated mean length composition for the total escapement was calculated by weighting the mean lengths in each stratum by the escapement of chum salmon past the weir during that stratum.

Ages were reported in the tables using European notation, with total age reported in parenthesis. European notation is composed of two numerals separated by a decimal, where the first numeral indicates the number of winters spent by the juvenile fish in fresh water and the second numeral indicates the number of winters spent in the ocean (Groot and Margolis 1991). Total age is equal to the sum of these two numerals, plus one to account for the winter when the egg was incubating in the gravel. For example, a chinook salmon described as an age-1.4 fish under European notation has a total age of 6 years.

The original ASL gum cards, acetates and mark-sense forms were archived at the ADF&G office in Anchorage. The computer files were archived by ADF&G in the Anchorage and Bethel offices.

Mark-Recapture Tag Recovery

The Tatlawiksuk River weir was integrated into two mark/recapture tagging studies conducted in the mainstem Kuskokwim River in 2003. In one study, uniquely numbered spaghetti tags were attached to chum, sockeye, and coho salmon in order to estimate annual abundance of these species upstream of the tagging site (Kerkvliet et al. *In press*). Fish were tagged near Kalskag and Aniak, and Tatlawiksuk River weir served as one of the tag recovery locations. The weir crew gathered three sets of data in association with this study: (1) recaptured tag numbers, (2) total tagged fish observed, and (3) a secondary mark sample. Recaptured tag number and total tagged fish observed data were used in generating abundance and run timing estimates, while the secondary mark sample was used for determining any tag loss. Details of tagging data collection can be found in Linderman et al. 2003a; an exception in 2003 was reducing the secondary mark sample to include only ASL sampled fish.

The second tagging study involving the weir was a radio telemetry project intended to estimate the total abundance of chinook salmon in the Kuskokwim River upstream of the village of Kalskag (Stuby *In press*). Radio transmitters were inserted into chinook salmon caught near Aniak, and one of several radio receiver stations was placed 100-yd upstream of the weir to monitor movement of tagged chinook salmon into the Tatlawiksuk River. The known chinook salmon passage at the weir, coupled with data collected from the receiver station, was used with similar data collected at other weir projects to develop estimates of the total chinook salmon abundance upstream from the tagging site.

Habitat Profiling

Stream Temperature

Water temperature was measured with a thermometer scaled in increments of 0.1^{o}C. Thermometers were calibrated before the season against a precision thermometer certified by the National Institute of Standards and Technology. Stream temperature was measured from a station on the south shore, approximately 75-yds downstream of the weir. Measurements were made at least once each day at 0730 or 1030 hours.

River Stage and Stream Discharge

Fluctuations in water level were monitored daily with a standardized staff gage. The staff gage consisted of a metal rod incremented in centimeters and secured to a stake driven into the stream channel near camp. Height of the water surface as measured against the staff gage represented the “stage” of water level in the river. River stage was measured to the nearest 0.5 cm at least once each morning at 0730 or 1030 hours. Measurements were recorded more frequently when water levels were changing rapidly. For purposes of this report, a river stage in excess of 100 cm was considered a high water event.

Semi-permanent benchmarks were used to calibrate the staff gage so stage measurements could be compared between years (Appendix B). These benchmarks consisted of sections of aluminum pipe several feet in length, driven into the gravel with only a few inches left exposed. The exposed tip of each pipe corresponded to a specific height above an arbitrary datum plane elevation. Multiple benchmarks were established for verification, and as safeguards to loss or damage.

RESULTS

Operations

The weir was operated from 20 June through 2 July in 2003. Operations were interrupted by an extreme high water event on 3 July. On 4 July the weir’s anchor system malfunctioned, causing the weir to dislodge from the river bottom and float down river. Approximately 25% of the panels and 50% of the rail was damaged beyond repair, and the fish trap was not recovered. The weir crew remained on site through early August salvaging, repairing, and rebuilding weir components. Extensive damage prevented the weir from being re-installed, and the camp was closed down for the season on 6 August.

Fish Passage and Escapement

Chinook Salmon

Total chinook salmon escapement in 2003 was estimated to be 1,683 fish (Table 1). A total of 601 chinook salmon were observed passing up stream through the weir and 1,082 fish (64.3%) were estimated to have passed up stream during the 3 July through 20 September inoperable period. Passage during the 15 through 19 June inoperable period was estimated to be zero because the first chinook salmon was observed on 22 June and historical run timing information indicates negligible chinook salmon abundance during this time period. The cumulative passage estimate for the 3 July through 20 September inoperable period was estimated from 14 radio tagged chinook salmon, 5 passed up stream during the 20 June through 2 July operational period and 9 passed up stream during the inoperable period (Figure 3, L. Stuby, ADF&G, Fairbanks, personal communication). Daily proportions from the Kwethluk River in 2003 were used to extrapolate daily passage estimates from the cumulative estimate. Based on the target operational period and inclusive of the estimated passage, the median passage date was 7 July, and the central fifty-percent of the run occurred between 29 June and 14 July.

Chum Salmon

A total of 479 chum salmon were observed in 2003 (Table 2). Total escapement was not determined because the observed passage data was insufficient to generate a reasonable estimate of chum salmon passage after the premature termination of the project. The first chum salmon was observed on 22 June, the third day of operation.

Coho Salmon

No coho salmon were observed during the operational period in 2003 (Table 3).

Other Species

No sockeye or pink salmon were observed during the operational period, but passage in 2003 included 55 longnose suckers (Tables 4 and 5).

Carcass Counts

Salmon carcass counts in 2003 included one chinook salmon and three chum salmon through 2 July (Appendix C).

ASL Composition of Escapement

Chinook Salmon

Scale samples, sex and length were collected from 45 chinook salmon in 2003. Samples were collected from one pulse, which was inadequate for estimating ASL composition of total escapement. Age was determined for 39 of the 45 fish sampled (Table 6). Age composition included 3 age-1.2 fish, 22 age-1.3 fish, 11 age-1.4 fish and 3 age-1.5 fish. Sex composition included 24 males, and 15 females. Male chinook salmon lengths ranged from 483 to 1020 mm and female lengths ranged from 718 to 933 mm (Table 7).

Chum Salmon

Scale samples, sex and length, were collected from 62 chum salmon in 2003, but the ASL composition of total escapement was not determined because of incomplete escapement and sample data. Age was determined for 57 of the 62 fish sampled (Table 8). Age composition included 48 age-0.3 fish, 7 age-0.4 fish and 2 age-0.5 fish. No age-0.2 fish were in the sample. Sex composition included 45 males, and 12 females. Male chum salmon lengths ranged from 505 to 689 mm and female lengths ranged from 513 to 618 mm (Table 9).

Mark-Recapture Tag Recovery

A total of two spaghetti tagged chum salmon were observed passing upstream through the weir prior to the premature termination of the project on 3 July. No spaghetti tagged sockeye or coho salmon were observed passing upstream through the weir in 2003.

A total of 14 radio tagged chinook salmon passed the weir site in 2003. Results from the radio-telemetry study will be reported separately (Stuby *In press*).

Habitat Profile

Water temperature, air temperature and water level were generally measured every morning from 10 June through 5 August (Appendix D). Water temperature ranged from 6.0° C to 11.0° C, and air temperature ranged from 3.0° C to 18.0° C. Stage measurements of daily water levels ranged from 44 cm to 243 cm. High water events occurred between 3 and 8 July, and from 28 July through camp closure on 6 August. The highest recorded stage measurement occurred on 31 July.

DISCUSSION

Operations

The weir was operational from 20 June through 2 July in 2003 when a high water event caused a critical malfunction of the weir rail on 4 July, and the weir was washed downstream. The high water event produced a large quantity of floating logs and other debris and submerged the weir under several feet of water. The weir initially came to rest on a gravel bar two bends downstream of camp, but continued high water and debris loads dislodged it and it finally came to rest approximately one-half mile from the Kuskokwim River confluence.

A definitive cause of the weir malfunction is unknown and will most likely remain that way; however, some evidence suggests cable strainers used to tension the weir's anchor cables were the weak point that caused the malfunction. The weir anchor cables remained intact at the weir site, but broken cable strainer spools were found still attached to several of these cables. In an operating weir rail system, cable strainers are attached to the weir rail and the anchor cable ends are wrapped around the cable strainer spools and lightly tensioned (Stewart 2003). If enough cable strainer spools broke under stress, it would likely result in a chain reaction malfunction of the weir rail anchoring system, causing the weir to dislodge. Although this explanation is speculative, a stronger replacement for the cable strainers should be used to prevent a similar malfunction in the future.

Once water levels receded, the crew began salvage operations on the remaining components. Surprisingly, approximately 50% of the weir rail and 75% of the weir panels could be repaired. More damage was expected given the severity of the high water event and subsequent malfunction. Debris loading and deeper water hampered salvage operations where the weir came to rest. Salvage operations were completed within two weeks of the wash-out, and the crew remained on site through the first week of August repairing salvaged components and building new components from spare materials. Unfortunately, the quantity of new and repaired components on hand was inadequate to attempt re-installation, and the time frame for acquiring new components exceeded the time frame of the coho salmon run and the project operational period. The crew closed down camp for the season on 6 August.

Additional weir components were constructed over the winter of 2003 - 2004. Design changes included a reinforced rail cable anchoring system, and a trap which incorporated a taller fish counting chute and longer drawbridge to aid in operations during moderate high water events. Plans for the 2004 season included pre-season shipment of new components to Aniak, and an earlier arrival date at camp to finalize new component assembly.

Fish Passage and Escapement

Chinook Salmon

Chinook salmon escapement in 2003 of 1,683 fish was intermediate to the higher escapements seen in 2001 and 2002 and the lower escapements in 1999 and 2000 (Figures 3 and 4).

Currently no formal escapement goal exists for Tatlawiksuk River chinook salmon to serve as a benchmark for assessing adequacy of escapements; therefore, we are left with comparing other escapement indicators, particularly those few tributaries which have escapement goals (Figures 5 and 6). Overall, chinook salmon escapements in 2003 were considered above average. Escapement goals were achieved at Kogrukluk River and at most aerial survey streams, and the chinook salmon aerial index goal was the second highest in over a decade. In contrast, 1999 and 2000 were considered especially poor years for chinook salmon escapement in the Kuskokwim River drainage. The 1999 and 2000 escapements for Kogrukluk River and aerial survey streams were half to a third of goals. In 2001 and 2002, chinook salmon escapements began to improve throughout much of the Kuskokwim River drainage. Tatlawiksuk River chinook salmon escapements have followed a similar trend with lower overall escapements in 1999 and 2000 followed by increasing escapements in 2001 and 2002. Intermediate escapement in 2003 is disproportional to the relatively large increases in escapements seen throughout most of the Kuskokwim River drainage in 2003.

Passage Estimates. In accordance with project objectives, chinook salmon passage was estimated for inoperable periods in 2003 to determine total chinook salmon escapement from 15 June through 20 September (Figure 3). The Kuskokwim River chinook salmon radio telemetry project (Stuby *In press*) presented an opportunity to utilize radio tagged chinook salmon for generating a reasonable estimate of missed chinook salmon passage. Arguably, the estimate is speculative because of the low number of radio tagged fish and because it represents 64.3% of observed passage; but the methodology used for the escapement estimate is not far removed from the methodology used for the radio telemetry total run estimate.

Chum Salmon

Chum salmon escapement to the Tatlawiksuk River was not determined in 2003 because of premature project termination (Figures 4 and 7). Observed passage through 2 July suggests chum salmon run timing may have been late because observed passage abundance was similar to chum salmon passage abundance in 1999 for the same time period (Table 2). Unfortunately, available chum salmon passage data was insufficient for any further speculation about Tatlawiksuk River chum salmon in 2003.

Coho Salmon

No coho salmon were observed at Tatlawiksuk River weir in 2003 because of premature project termination; but we can offer some speculation about Tatlawiksuk River coho salmon abundance in 2003 based on coho salmon escapement results at other Kuskokwim River escapement projects. Coho salmon escapement in 2003 was highest on record at all other Kuskokwim River escapement projects (Figure 8). If this trend held true for Tatlawiksuk River coho salmon, we can speculate that escapement in 2003 would have exceeded the known high escapement of 11,345 fish in 2002, and may have surpassed the speculative estimate of 30,000 fish in 2000 (Linderman et al. 2002).

Other Species

Other salmon species observed historically in the Tatlawiksuk River include small numbers of sockeye and pink salmon (Table 4). The Tatlawiksuk River is not a primary spawning tributary for these species; therefore, it is not surprising that no sockeye or pink salmon were observed in 2003 before the project's premature termination.

Longnose suckers are the most abundant non-salmon species counted through the Tatlawiksuk River weir. The highest recorded passage of this species was 5,093 fish in 1999 (Table 5). However, abundance estimates are incomplete because upstream migration of this species starts before the start of operations. Only 55 longnose suckers were counted upstream through the weir in 2003 prior to 3 July when the weir washed out.

Carcass Counts

The use of carcass counts for estimating "stream life" of chinook and chum salmon has been abandoned as this analysis is believed unreliable (Linderman et al. 2003a and 2003b). Stream life estimates from carcass counts are believed unreliable because of the small percentage of carcasses to escapement, annual variability of carcass to escapement percentages, and potential biases in sex ratios between carcasses and escapement. As would be expected, the project's premature termination resulted in incomplete carcass counts (Appendix C). The small percentage of observed carcasses in previous years has positive ramifications for aerial stream surveys because most observable spawning salmon and their carcasses reside upstream of the river's first four miles when surveys are typically flown. Another benefit is protracted retention of carcasses on the spawning grounds enhances absorption of marine derived nutrients within the Tatlawiksuk River (Cederholm et al. 1999, Cederholm et al. 2000).

ASL Composition of Escapement

The premature termination of the project in 2003 resulted in an inadequate number of chinook and chum salmon ASL samples for estimating ASL composition of escapement. In past years, the authors described trends seen within the Tatlawiksuk River ASL dataset coupled with broad reference to the generalized historical ASL trends described in DuBois and Molyneaux (2000) and unpublished Kuskokwim River ASL data for the years 2000 through 2003 (Folletti 2004). Probably the greatest value in collecting ASL information is for future application toward developing spawner-recruit models used for establishing escapement goals (e.g., Clark and Sandone 2001). This information can be used for forecasting future runs, and to illustrate long-term trends in ASL composition (e.g., Bigler et al. 1996).

Chinook Salmon

Although chinook salmon samples were inadequate for generating ASL composition estimates of total escapement in 2003, some comparisons can be made to ASL composition trends based on the collected samples. Although the samples were inadequate for comparisons in age and sex composition trends, they did indicate length partitioning by age class for male and female fish (Figure 9). The trend of chinook salmon length partitioning by age class is consistent with historical chinook salmon ASL data at the Tatlawiksuk River and with ASL composition estimates from other Kuskokwim River escapement projects (Folletti 2004).

Chum Salmon

Chum salmon samples were inadequate for generating ASL composition estimates in 2003; however, some comparisons can again be made to ASL composition trends based on the collected samples. The percentage of age-0.3 chum salmon was higher on average at all other Kuskokwim River escapement projects in 2003 (Folletti 2004). Although the Tatlawiksuk River samples were inadequate for comparisons of sex composition trends, they did indicate a similar trend of higher than average age-0.3 chum salmon (84.2%, Figure 10). The percentage of younger aged chum salmon is typically less than 50% at the beginning of the run, which is in contrast to the 2003 samples. The only other year Tatlawiksuk River exhibited a similar trend of higher than average age-0.3 chum salmon was 1998, consistent with other Kuskokwim River escapement projects in that year. The high percentage of age-0.3 chum salmon is an indicator for potential good returns of age-0.4 fish in 2004.

Additionally, the samples indicated length partitioning by age class for male and female chum salmon (Figure 11). The trend of chum salmon length partitioning by age class is consistent with historical chinook salmon ASL data at the Tatlawiksuk River and with ASL composition estimates from other Kuskokwim River escapement projects (Folletti 2004).

Mark-recapture Tag Recovery

Details of the Kuskokwim River salmon mark recapture project will be described in Kerkvliet et al. (*in press*). The small number of observed and recovered spaghetti tagged fish at Tatlawiksuk River weir was a result of premature project termination. The numbers of recovered tagged fish was inadequate for generating travel time, swim speed, and in-river run timing estimates of Tatlawiksuk River chum and coho salmon populations.

Habitat Profiling

In 2003, water temperatures fluctuated between 6 °C and 11 °C and air temperature fluctuated between 3 °C and 18 °C (Appendix D). These results were similar to temperature ranges seen in previous years for that time period, although it should be noted that temperatures were not recorded for the entire operational period of 15 June through 20 September (Linderman et al. 2003b).

In 2003, observed river stage fluctuated between 44 cm and 243 cm through 5 August (Appendix D). These results were higher than river stage ranges for the same time period in previous years, however, river stage was not recorded during a similar high water event in 1998 (Figure 7).

Of the four river-stage benchmarks established at the Tatlawiksuk River, benchmark three and four still remain (Appendix B). These benchmarks are not permanent structures. Their heights above the datum plane should be linked to a permanent structure along the stream bank, but bank instability at the campsite prevents construction of a permanent link to the benchmarks. These benchmarks must be evaluated and maintained on an annual basis to ensure their success.

CONCLUSIONS

1) The weir malfunction in 2003Indicates the need for a stronger system to attach the anchoring cables to the weir rail.:

2) Total escapements of chinook salmon at the Tatlawiksuk River weir project: Indicate a slight decrease in chinook salmon escapement in 2003, in contrast to the overall above average escapements seen elsewhere in the Kuskokwim River drainage.

3) The ASL data collected at the Tatlawiksuk River weir project in 2002:
   a) Indicate trends similar to existing ASL data of Kuskokwim River salmon stocks, and
   b) Indicate good returns of age-0.4 chum salmon in 2004.

4) The habitat profile data collected at the George River weir project allow comparison of water levels between years and enabled better assessment of weir performance.:

RECOMMENDATIONS

Operations

- **Design a stronger system for attaching the anchor cables to the weir rail.** As of this writing, several designs using a variety of stronger components are being evaluated to replace the cable strainers in the 2004 season.

- **Incorporate a videography system to allow for continuous fish passage opportunity**. One means of addressing adequate fish passage concerns is incorporation of a videography system to enumerate fish passage. Limitations to this approach include: adequate funding for equipment costs; logistical difficulties in generating adequate power in a remote location; and the added likelihood fish passage data will be lost because of equipment malfunction, human error, or other unforeseeable complications.

Fish Passage

- **Annual operation of the Tatlawiksuk River weir should continue indefinitely.** Although the weir malfunction caused the project to terminate prematurely in 2003, the Tatlawiksuk River weir project has been a valuable addition to the array of well-distributed escapement monitoring projects throughout the Kuskokwim River drainage. Adequate monitoring of Kuskokwim River salmon escapements is one of many requirements needed for long term, sustainable management of Kuskokwim River salmon stocks. Discontinuation of the Tatlawiksuk River, or any other escapement monitoring project, would be a step backward from progress made in recent years toward collecting salmon stock assessment and information needs in the Kuskokwim River drainage. Additionally, the Tatlawiksuk River weir project serves as one of several data collection platforms critical to other Kuskokwim River salmon research projects. *Kuskokwim River Chinook Salmon Stock Assessment Project* (FIS #02-046) is critically dependent on data collected from these weirs to generate total river abundance estimates. *Kuskokwim River salmon mark/recapture project* (FIS #04-308) uses weir-recaptured spaghetti tagged chum, sockeye, and coho salmon to develop and test total river abundance estimates, and these recaptures are critical for determining stock-specific run timing in the mainstem Kuskokwim River. Tatlawiksuk

River is part of the genetic stock identification (GSI) baseline for chum, chinook, and coho salmon, and plans are underway to use the weir for additional sample collection.

- **Establish escapement goals for Tatlawiksuk River chinook, chum and coho salmon.** State managers continue seeking to establish biological escapement goals (BEG) to produce maximum sustainable yield (MSY) for these species at the Tatlawiksuk River, and in other Kuskokwim River spawning tributaries; however, determining MSY requires a rigorous level of stock specific spawner-recruit information still lacking. Alternatively, sustainable escapement goals (SEG) can be established, but require a 5- to 10- year data series of reliable escapement estimates that demonstrate sustainable yields. Recent deliberations on establishing escapement goals at the Tatlawiksuk River and other Kuskokwim River tributaries resulted in inaction because of inadequate historical escapement information, heightening the need for uninterrupted continuation of the project.

ASL Data

- **Sample size objectives for ASL sampling of chinook salmon should be re-evaluated and made more appropriate to the actual run sizes encountered in the Tatlawiksuk River.** Under current methods, the crew is expected to annually collect 630 chinook salmon; i.e., three pulses each consisting of 210 fish. The total annual chinook run in the Tatlawiksuk River, however, has only ranged from 817 to 2,237 fish. The current ASL sampling size objectives are designed for larger populations, therefore may not be appropriate for the chinook salmon population found in Tatlawiksuk River. Sampling objectives need to be reviewed in context with the low abundance of chinook salmon.

Project Management

- **The Tatlawiksuk River weir should continue to be operated jointly by KNA and ADF&G.** The partnership developed between KNA and ADF&G in the operation of fisheries projects, including the Tatlawiksuk River weir, has proven to be a successful strategy. Each organization compliments the partnership by providing an element the other cannot.

  KNA provides a communication link to help its constituents be more informed and less prone to the distrust and misinformation that can result when local organizations and their constituents are not directly involved. Active involvement of KNA adds an element of trust and acceptance toward the projects and ADF&G, which would not exist if ADF&G operated these projects alone. KNA is more effective at hiring technicians for these projects from the local area, and makes these jobs more acceptable and accessible for potential applicants. Additionally, the proximity of KNA facilities to these cooperatively managed projects provides logistical benefits for staging and for responding to various inseason project needs. In this respect, KNA functions much like a satellite office of ADF&G.

Despite these attributes, KNA would have difficulty managing the Tatlawiksuk River weir and other jointly operated fisheries projects without ADF&G involvement. The fisheries staff of ADF&G has a greater depth of experience in fisheries project management; both in terms of on-site field experience, and broader aspects such as planning, data management and analysis, and report writing. The addition of a Partners Fisheries Biologist to the KNA staff has shifted some of these responsibilities to KNA, evident with the inclusion of David Cannon as a co-author of this report. However, addition of one fisheries biologist to the KNA staff has not replaced all ADF&G personnel involved and the many years of fisheries management experience, scientific expertise, and understanding they contribute. Additionally, KNA's fisheries biologist has a myriad of other responsibilities, and is involved with multiple projects and with multiple cooperative partners. This time limit reduces the direct attention KNA's biologist can contribute to individual project requirements.

Partnership between KNA and ADF&G is a major contributing factor to success of the many fisheries projects for which these organizations are responsible. Dissolution of this partnership would result in a detrimental loss of continuity and support to both inseason and postseason project requirements, and increases the possibility of misunderstanding and mistrust between ADF&G, KNA and the public. Continued joint operation will help to ensure the success of these projects in the future.

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TABLES

Table 1. Historical chinook salmon passage at the Tatlawiksuk River weir.

	Daily Passage						Cumulative Passage						Percent Passage				
Date	1998	1999	2000	2001	2002	2003	1998	1999	2000	2001	2002	2003	1999	2000	2001	2002	2003
6/15	0 b	0	0	0 b	0 b	0 b	0	0	0	0	0	0	0	0	0	0	0
6/16	0 b	0	0	0 b	0 b	0 b	0	0	0	0	0	0	0	0	0	0	0
6/17	0 b	0	0	0 b	0 e	0 b	0	0	0	0	0	0	0	0	0	0	0
6/18	0	0	2	0 b	0	0 b	0	0	2	0	0	0	0	0	0	0	0
6/19	0	0	2	0 b	0	0 b	0	0	4	0	0	0	0	0	0	0	0
6/20	1	0	0	0	0	0	1	0	4	0	0	0	0	0	0	0	0
6/21	0	0	0	1	1	0	1	0	4	1	1	0	0	0	0	0	0
6/22	0	0	1	2	19	6	1	0	5	3	20	6	0	1	0	1	0
6/23	8	4	0	1	67	0	9	4	5	4	87	6	0	1	0	4	0
6/24	12	2	10	3	3	5	21	6	15	7	90	11	0	2	0	4	1
6/25	7	2	0	5	2	13	28	8	15	12	92	24	1	2	1	4	1
6/26	12	6	20	71	8	19	40	14	35	83	100	43	1	4	4	4	3
6/27	37	4	2	18	517	3	77	18	37	101	617	46	1	5	5	28	3
6/28	31	14	5	38	21	152	108	32	42	139	638	198	2	5	7	29	12
6/29	23	5	2	15	195	297	131	37	44	154	833	495	2	5	8	37	29
6/30	5	2	22	105	25	57	136	39	66	259	858	552	3	8	13	38	33
7/01	99	16	26	364	15	41	235	55	92	623	873	593	4	11	31	39	35
7/02	182	5	149	24	84	8	417	60	241	647	957	601	4	29	32	43	36
7/03	171	13	47	27	108	96 b	588	73	288	674	1,065	697	5	35	34	48	41
7/04	224	26	30	13	135	29 b	812	99	318	687	1,200	726	7	39	34	54	43
7/05	74	14	42	111	338	59 b	886	113	360	798	1,538	786	8	44	40	69	47
7/06	62	15	17	428	64	42 b	948	128	377	1,226	1,602	827	9	46	61	72	49
7/07	22 d	14	18	170	145	13 b	970	142	395	1,396	1,747	841	10	48	69	78	50
7/08	c	13	13	21	10	27 b		155	408	1,417	1,757	868	10	50	70	79	52
7/09	c	21	73	29	24	129 b		176	481	1,446	1,781	997	12	59	72	80	59
7/10	c	40	51	29	27	35 b		216	532	1,475	1,808	1,033	14	65	73	81	61
7/11	c	79 a	45	14	48	35 b		295	577	1,489	1,856	1,068	20	71	74	83	63
7/12	c	118	50	48	19	34 b		413	627	1,537	1,875	1,102	28	77	76	84	65
7/13	c	54	9	150	20	88 b		467	636	1,687	1,895	1,190	31	78	84	85	71
7/14	c	64	0	48	21	65 b		531	636	1,735	1,916	1,255	36	78	86	86	75
7/15	c	24	8	47	103	38 b		555	644	1,782	2,019	1,293	37	79	89	90	77
7/16	c	65	20	12	10	28 b		620	664	1,794	2,029	1,321	41	81	89	91	78
7/17	c	6	47	19	15	18 b		626	711	1,813	2,044	1,339	42	87	90	91	80
7/18	c	146	5	31	3	22 b		772	716	1,844	2,047	1,361	52	88	92	92	81
7/19	c	20	8	36	15	30 b		792	724	1,880	2,062	1,390	53	89	93	92	83
7/20	c	381	10	17	8	72 b		1,173	734	1,897	2,070	1,462	79	90	94	93	87
7/21	c	18	2	8	14	9 b		1,191	736	1,905	2,084	1,471	80	90	95	93	87
7/22	c	9	16	21	29	15 b		1,200	752	1,926	2,113	1,486	80	92	96	94	88
7/23	c	86	7	11	13	17 b		1,286	759	1,937	2,126	1,503	86	93	96	95	89
7/24	c	46	5	13 b	7	25 b		1,332	764	1,950	2,133	1,528	89	93	97	95	91
7/25	c	33	8	9 b	18	16 b		1,365	772	1,959	2,151	1,544	91	94	97	96	92
7/26	c	18	2	6	4	14 b		1,383	774	1,965	2,155	1,558	93	95	98	96	93
7/27	c	14 a	3	5 b	24	14 b		1,397	777	1,970	2,179	1,572	94	95	98	97	93
7/28	c	10	1	2	20	16 b		1,407	778	1,972	2,199	1,588	94	95	98	98	94
7/29	c	22	1	8	10	13 b		1,429	779	1,980	2,209	1,602	96	95	98	99	95
7/30	c	15	6	3	5	8 b		1,444	785	1,983	2,214	1,610	97	96	99	99	96
7/31	c	6	1	5 b	6	16 b		1,450	786	1,988	2,220	1,627	97	96	99	99	97
8/01	c	6	2	4 b	1	6 b		1,456	788	1,992	2,221	1,632	97	96	99	99	97
8/02	c	1	3 b	3 b	5	8 b		1,457	791	1,995	2,226	1,640	98	97	99	100	97
8/03	c	4	8	2 b	0	6 b		1,461	799	1,997	2,226	1,646	98	98	99	100	98
8/04	c	3	2	2	1	2 b		1,464	801	1,999	2,227	1,648	98	98	99	100	98
8/05	c	5	0	1	0	2 b		1,469	801	2,000	2,227	1,650	98	98	99	100	98
8/06	c	3	1	1	0	4 b		1,472	802	2,001	2,227	1,653	99	98	100	100	98
8/07	c	2	1	2	1	2 b		1,474	803	2,003	2,228	1,656	99	98	100	100	98
8/08	c	4	3	2	0	2 b		1,478	806	2,005	2,228	1,658	99	99	100	100	99
8/09	c	0	1	0	1	2 b		1,478	807	2,005	2,229	1,660	99	99	100	100	99
8/10	c	1 b	1	1	0	2 b		1,479	808	2,006	2,229	1,661	99	99	100	100	99
8/11	c	1 b	1	0	0	1 b		1,480	809	2,006	2,229	1,662	99	99	100	100	99
8/12	c	1 b	0	2	1	3 b		1,481	809	2,008	2,230	1,665	99	99	100	100	99
8/13	c	1 b	1	1	0	3 b		1,482	810	2,009	2,230	1,668	99	99	100	100	99
8/14	c	1 b	2 b	0	0	2 b		1,483	812	2,009	2,230	1,670	100	99	100	100	99
8/15	c	1 b	1 b	0	2	1 b		1,484	814	2,009	2,232	1,671	100	100	100	100	99
8/16	c	1 b	1 b	0	0	1 b		1,485	814	2,009	2,232	1,673	100	100	100	100	99
8/17	c	1 b	0 b	0 b	0	1 b		1,486	814	2,009	2,232	1,674	100	100	100	100	99
8/18	c	1 b	0 b	0 b	0	1 b		1,487	815	2,009	2,232	1,675	100	100	100	100	100
8/19	c	1 b	1 b	0 b	1	1 b		1,488	815	2,009	2,233	1,676	100	100	100	100	100
8/20	c	0 b	0 b	0 b	0	2 b		1,488	815	2,009	2,233	1,678	100	100	100	100	100
8/21	c	0 b	0 b	0 b	1	1 b		1,488	815	2,009	2,234	1,679	100	100	100	100	100
8/22	c	0 b	0 b	0 b	0	1 b		1,488	816	2,009	2,234	1,680	100	100	100	100	100
8/23	c	0 b	1 b	0 b	0	1 b		1,488	816	2,009	2,234	1,680	100	100	100	100	100
8/24	c	0	0 b	0 b	0	1 b		1,488	816	2,009	2,234	1,681	100	100	100	100	100
8/25	c	1	0 b	0 b	0	0 b		1,489	816	2,009	2,234	1,681	100	100	100	100	100
8/26	c	0 a	1 b	0 b	0	0 b		1,489	817	2,009	2,234	1,682	100	100	100	100	100
8/27	c	0	0 b	2 b	0	0 b		1,489	817	2,011	2,234	1,682	100	100	100	100	100
8/28	c	0	0 b	0	0	0 b		1,489	817	2,011	2,234	1,682	100	100	100	100	100
8/29	c	0	0 b	0	0	0 b		1,489	817	2,011	2,234	1,682	100	100	100	100	100
8/30	c	0	0 b	0	0	0 b		1,489	817	2,011	2,234	1,682	100	100	100	100	100
8/31	c	0	0 b	0	0	0 b		1,489	817	2,011	2,234	1,682	100	100	100	100	100
9/01	c	0	0 b	0	0	0 b		1,489	817	2,011	2,234	1,682	100	100	100	100	100
9/02	c	1	0 b	0	0	0 b		1,490	817	2,011	2,234	1,682	100	100	100	100	100

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Table 1. (page 2 of 2)

	Daily Passage						Cumulative Passage						Percent Passage				
Date	1998	1999	2000	2001	2002	2003	1998	1999	2000	2001	2002	2003	1999	2000	2001	2002	2003
9/03	c	0	0 b	0	1	0 b		1,490	817	2,011	2,235	1,682	100	100	100	100	100
9/04	c	0	0 b	0	0	0 b		1,490	817	2,011	2,235	1,683	100	100	100	100	100
9/05	c	0	0 b	0	0	0 b		1,490	817	2,011	2,235	1,683	100	100	100	100	100
9/06	c	0	0 b	0	0	0 b		1,490	817	2,011	2,235	1,683	100	100	100	100	100
9/07	c	0	0 b	0	1	0 b		1,490	817	2,011	2,236	1,683	100	100	100	100	100
9/08	c	0	0 b	0	0	0 b		1,490	817	2,011	2,236	1,683	100	100	100	100	100
9/09	c	0	0 b	0	1	0 b		1,490	817	2,011	2,237	1,683	100	100	100	100	100
9/10	c	0	0 b	0	0	0 b		1,490	817	2,011	2,237	1,683	100	100	100	100	100
9/11	c	0	0 b	0	0	0 b		1,490	817	2,011	2,237	1,683	100	100	100	100	100
9/12	c	0	0 b	0	0 e	0 b		1,490	817	2,011	2,237	1,683	100	100	100	100	100
9/13	c	0	0 b	0	0 b	0 b		1,490	817	2,011	2,237	1,683	100	100	100	100	100
9/14	c	0	0 b	0	0 b	0 b		1,490	817	2,011	2,237	1,683	100	100	100	100	100
9/15	c	0	0 b	0	0 b	0 b		1,490	817	2,011	2,237	1,683	100	100	100	100	100
9/16	c	0	0 b	0 b	0 b	0 b		1,490	817	2,011	2,237	1,683	100	100	100	100	100
9/17	c	0	0 b	0 b	0 b	0 b		1,490	817	2,011	2,237	1,683	100	100	100	100	100
9/18	c	0	0 b	0 b	0 b	0 b		1,490	817	2,011	2,237	1,683	100	100	100	100	100
9/19	c	0	0 b	0 b	0 b	0 b		1,490	817	2,011	2,237	1,683	100	100	100	100	100
9/20	c	0	0 b	0 b	0 e	0 b		1,490	817	2,011	2,237	1,683	100	100	100	100	100
Total	970	1,490	817	2,011	2,237	1,683											
Obs.	970	1,413	807	1,973	2,237	601											
Est. (%)	0	5.2	1.3	1.9	0	64.29											

a = Daily passage was estimated due to the occurance of a hole in the weir.
b = The weir was not operational; daily passage was estimated.
c = The weir was not operational; daily passage was not estimated
d = Partial day count, passage was not estimated.
e = Partial day count, passage was estimated.

Table 2. Hostorical chum salmon passage at the Tatlawiksuk River weir.

	Daily Passage						Cumulative Passage									
Date	1998	1999	2000	2001	2002	2003	1998	1999	2000	2001	2002	2003	1999	2000	2001	2002
6/15	0 b	0	1	0 b	1 b	c	0	0	1	0	1		0	0	0	0
6/16	0 b	0	1	0 b	2 b	c	0	0	2	0	3		0	0	0	0
6/17	0 b	0	0	0 b	4 e	c	0	0	2	0	7		0	0	0	0
6/18	0	0	2	0 b	2	c	0	0	4	0	9		0	0	0	0
6/19	0	0	0	0 b	6	c	0	0	4	0	15		0	0	0	0
6/20	0	0	0	0	3	0	0	0	4	0	18	0	0	0	0	0
6/21	5	0	2	3	42	0	5	0	6	3	60	0	0	0	0	0
6/22	4	0	7	4	168	1	9	0	13	7	228	1	0	0	0	1
6/23	12	0	1	30	262	5	21	0	14	37	490	6	0	0	0	2
6/24	25	18	18	22	28	6	46	18	32	59	518	12	0	0	0	2
6/25	26	7	30	61	103	4	72	25	62	120	621	16	0	1	1	3
6/26	65	18	97	131	483	12	137	43	159	251	1,104	28	0	2	1	4
6/27	197	25	7	69	392	20	334	68	166	320	1,496	48	1	2	1	6
6/28	275	67	10	143	574	106	609	135	176	463	2,070	154	1	2	2	8
6/29	195	67	3	133	834	71	804	202	179	596	2,904	225	2	3	3	12
6/30	146	58	88	368	634	135	950	260	267	964	3,538	360	3	4	4	14
7/01	464	91	176	440	424	78	1,414	351	443	1,404	3,962	438	4	6	6	16
7/02	529	86	492	143	1037	41	1,943	437	935	1,547	4,999	479	5	13	7	20
7/03	556	101	280	171	501	c	2,499	538	1,215	1,718	5,500		6	17	7	22
7/04	1,005	110	147	162	759	c	3,504	648	1,362	1,880	6,259		7	19	8	26
7/05	1,011	94	325	488	1278	c	4,515	742	1,687	2,368	7,537		8	24	10	31
7/06	757	141	155	618	1762	c	5,272	883	1,842	2,986	9,299		9	26	13	38
7/07	454	171	175	778	809	c	5,726	1,054	2,017	3,764	10,108		11	29	16	41
7/08	c	158	109	900	666	c		1,212	2,126	4,664	10,774		13	30	20	44
7/09	c	324	462	1,061	840	c		1,536	2,588	5,725	11,614		16	37	24	47
7/10	c	391	247	1,399	828	c		1,927	2,835	7,124	12,442		20	40	30	51
7/11	c	404 a	391	596	1238	c		2,331	3,226	7,720	13,680		24	46	33	56
7/12	c	416	611	1,179	869	c		2,747	3,837	8,899	14,549		28	54	38	59
7/13	c	280	169	1,199	702	c		3,027	4,006	10,098	15,251		31	57	43	62
7/14	c	361	33	1,301	707	c		3,388	4,039	11,399	15,958		35	57	48	65
7/15	c	268	266	1,330	1123	c		3,656	4,305	12,729	17,081		38	61	54	70
7/16	c	377	367	1,092	677	c		4,033	4,672	13,821	17,758		42	66	58	72
7/17	c	339	257	1,201	959	c		4,372	4,929	15,022	18,717		45	70	63	76
7/18	c	404	183	1,607	880	c		4,776	5,112	16,629	19,597		49	73	70	80
7/19	c	160	144	859	707	c		4,936	5,256	17,488	20,304		51	75	74	83
7/20	c	663	88	699	468	c		5,599	5,344	18,187	20,772		58	76	77	85
7/21	c	306	176	761	504	c		5,905	5,520	18,948	21,276		61	78	80	87
7/22	c	275	238	650	515	c		6,180	5,758	19,598	21,791		64	82	83	89
7/23	c	628	158	614	409	c		6,808	5,916	20,212	22,200		71	84	85	90
7/24	c	322	152	511 b	251	c		7,130	6,068	20,723	22,451		74	86	87	91
7/25	c	338	114	391 b	206	c		7,468	6,182	21,114	22,657		77	88	89	92
7/26	c	205	85	270	195	c		7,673	6,267	21,384	22,852		79	89	90	93
7/27	c	214 a	122	206 b	301	c		7,886	6,389	21,590	23,153		82	91	91	94
7/28	c	222	93	169	224	c		8,108	6,482	21,759	23,377		84	92	92	95
7/29	c	130	94	178	159	c		8,238	6,576	21,937	23,536		85	93	92	96
7/30	c	285	141	230	144	c		8,523	6,717	22,167	23,680		88	95	93	96
7/31	c	141	72	190 b	119	c		8,664	6,789	22,357	23,799		90	96	94	97
8/01	c	171	41	176 b	99	c		8,835	6,830	22,533	23,898		91	97	95	97
8/02	c	125	37 b	163 b	59	c		8,960	6,867	22,696	23,957		93	97	96	98
8/03	c	141	18	149 b	54	c		9,101	6,885	22,845	24,011		94	98	96	98
8/04	c	60	15	131	64	c		9,161	6,900	22,976	24,075		95	98	97	98
8/05	c	57	8	139	98	c		9,218	6,908	23,115	24,173		95	98	97	98
8/06	c	35	9	96	44	c		9,253	6,917	23,211	24,217		96	98	98	99
8/07	c	43	12	95	55	c		9,296	6,929	23,306	24,272		97	98	98	99
8/08	c	24	5	62	72	c		9,320	6,934	23,368	24,344		97	98	99	99
8/09	c	42	2	69	30	c		9,362	6,936	23,437	24,374		98	98	99	99
8/10	c	30 b	5	36	37	c		9,392	6,941	23,473	24,411		98	99	99	99
8/11	c	28 b	7	38	22	c		9,420	6,948	23,511	24,433		98	99	99	100
8/12	c	26 b	8	38	25	c		9,446	6,956	23,549	24,458		98	99	99	100
8/13	c	24 b	9	27	13	c		9,470	6,965	23,576	24,471		99	99	99	100
8/14	c	22 b	10 b	19	5	c		9,492	6,975	23,595	24,476		99	99	99	100
8/15	c	20 b	4 b	23	13	c		9,512	6,979	23,618	24,489		99	99	100	100
8/16	c	17 b	4 b	8	8	c		9,529	6,983	23,626	24,497		99	99	100	100
8/17	c	15 b	4 b	14 b	8	c		9,544	6,987	23,640	24,505		99	99	100	100
8/18	c	13 b	2 b	13 b	15	c		9,557	6,989	23,653	24,520		100	99	100	100
8/19	c	11 b	6 b	12 b	1	c		9,568	6,995	23,665	24,521		100	99	100	100
8/20	c	9 b	14 b	11 b	2	c		9,577	7,009	23,675	24,523		100	100	100	100
8/21	c	7 b	8 b	9 b	1	c		9,584	7,017	23,684	24,524		100	100	100	100
8/22	c	4 b	0 b	8 b	2	c		9,588	7,017	23,692	24,526		100	100	100	100
8/23	c	1 b	2 b	7 b	0	c		9,589	7,019	23,699	24,526		100	100	100	100
8/24	c	1	0 b	6 b	2	c		9,590	7,019	23,705	24,528		100	100	100	100
8/25	c	0	6 b	4 b	2	c		9,590	7,025	23,709	24,530		100	100	100	100
8/26	c	2 a	2 b	3 b	2	c		9,592	7,027	23,712	24,532		100	100	100	100
8/27	c	2	2 b	2 b	0	c		9,594	7,029	23,714	24,532		100	100	100	100
8/28	c	0	2 b	1	0	c		9,594	7,031	23,715	24,532		100	100	100	100
8/29	c	0	2 b	0	2	c		9,594	7,033	23,715	24,534		100	100	100	100
8/30	c	0	2 b	0	1	c		9,594	7,035	23,715	24,535		100	100	100	100
8/31	c	1	0 b	0	2	c		9,595	7,035	23,715	24,537		100	100	100	100
9/01	c	0	4 b	0	2	c		9,595	7,039	23,715	24,539		100	100	100	100

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Table 2. (page 2 of 2)

	Daily Passage						Cumulative Passage						Percent Passage			
Date	1998	1999	2000	2001	2002	2003	1998	1999	2000	2001	2002	2003	1999	2000	2001	2002
9/02	c	1	0 b	2	1	c		9,596	7,039	23,717	24,540		100	100	100	100
9/03	c	0	2 b	1	0	c		9,596	7,041	23,718	24,540		100	100	100	100
9/04	c	0	0 b	0	0	c		9,596	7,041	23,718	24,540		100	100	100	100
9/05	c	1	2 b	0	1	c		9,597	7,044	23,718	24,541		100	100	100	100
9/06	c	2	0 b	0	0	c		9,599	7,044	23,718	24,541		100	100	100	100
9/07	c	0	0 b	0	0	c		9,599	7,044	23,718	24,541		100	100	100	100
9/08	c	0	0 b	0	0	c		9,599	7,044	23,718	24,541		100	100	100	100
9/09	c	0	0 b	0	0	c		9,599	7,044	23,718	24,541		100	100	100	100
9/10	c	0	0 b	0	0	c		9,599	7,044	23,718	24,541		100	100	100	100
9/11	c	0	0 b	0	0	c		9,599	7,044	23,718	24,541		100	100	100	100
9/12	c	0	0 b	0	1 e	c		9,599	7,044	23,718	24,542		100	100	100	100
9/13	c	0	0 b	0	0 b	c		9,599	7,044	23,718	24,542		100	100	100	100
9/14	c	0	0 b	0	0 b	c		9,599	7,044	23,718	24,542		100	100	100	100
9/15	c	0	0 b	0	0 b	c		9,599	7,044	23,718	24,542		100	100	100	100
9/16	c	0	0 b	0 b	0 b	c		9,599	7,044	23,718	24,542		100	100	100	100
9/17	c	0	0 b	0 b	0 b	c		9,599	7,044	23,718	24,542		100	100	100	100
9/18	c	0	0 b	0 b	0 b	c		9,599	7,044	23,718	24,542		100	100	100	100
9/19	c	0	0 b	0 b	0 b	c		9,599	7,044	23,718	24,542		100	100	100	100
9/20	c	0	0 b	0 b	0 e	c		9,599	7,044	23,718	24,542		100	100	100	100
Total	5,726	9,599	7,044	23,718	24,542	479										
Obs.	5,726	9,147	6,928	22,109	24,539	n.a										
Est. (%)	0.0	4.7	1.6	6.8	0.0	n.a										

a = Daily passage was estimated due to the occurance of a hole in the weir.
b = The weir was not operational; daily passage was estimated.
c = The weir was not operational; daily passage was not estimated
d = Partial day count, passage was not estimated.
e = Partial day count, passage was estimated.

Table 3. Historical coho salmon passage at the Tatlawiksuk River weir.

	Daily Passage					Cumulative Passage				Percent Passage		
Date	1999	2000	2001	2002	2003	1999	2000	2001	2002	1999	2001	2002
6/15	0	0	0	0 b	c	0	0	0	0	0	0	0
6/16	0	0	0	0 b	c	0	0	0	0	0	0	0
6/17	0	0	0	0 e	c	0	0	0	0	0	0	0
6/18	0	0	0	0	c	0	0	0	0	0	0	0
6/19	0	0	0	0	c	0	0	0	0	0	0	0
6/20	0	0	0	0	0	0	0	0	0	0	0	0
6/21	0	0	0	0	0	0	0	0	0	0	0	0
6/22	0	0	0	0	0	0	0	0	0	0	0	0
6/23	0	0	0	0	0	0	0	0	0	0	0	0
6/24	0	0	0	0	0	0	0	0	0	0	0	0
6/25	0	0	0	0	0	0	0	0	0	0	0	0
6/26	0	0	0	0	0	0	0	0	0	0	0	0
6/27	0	0	0	0	0	0	0	0	0	0	0	0
6/28	0	0	0	0	0	0	0	0	0	0	0	0
6/29	0	0	0	0	0	0	0	0	0	0	0	0
6/30	0	0	0	0	0	0	0	0	0	0	0	0
7/01	0	0	0	0	0	0	0	0	0	0	0	0
7/02	0	0	0	0	0	0	0	0	0	0	0	0
7/03	0	0	0	0	c	0	0	0	0	0	0	0
7/04	0	0	0	0	c	0	0	0	0	0	0	0
7/05	0	0	0	0	c	0	0	0	0	0	0	0
7/06	0	0	0	0	c	0	0	0	0	0	0	0
7/07	0	0	0	0	c	0	0	0	0	0	0	0
7/08	0	0	0	0	c	0	0	0	0	0	0	0
7/09	0	0	0	0	c	0	0	0	0	0	0	0
7/10	0	0	0	0	c	0	0	0	0	0	0	0
7/11	0 a	0	0	0	c	0	0	0	0	0	0	0
7/12	0	0	0	0	c	0	0	0	0	0	0	0
7/13	0	0	0	0	c	0	0	0	0	0	0	0
7/14	0	0	0	0	c	0	0	0	0	0	0	0
7/15	0	0	0	0	c	0	0	0	0	0	0	0
7/16	0	0	0	0	c	0	0	0	0	0	0	0
7/17	0	0	0	0	c	0	0	0	0	0	0	0
7/18	0	0	0	0	c	0	0	0	0	0	0	0
7/19	0	2	0	0	c	0	2	0	0	0	0	0
7/20	0	0	0	0	c	0	2	0	0	0	0	0
7/21	0	1	0	0	c	0	3	0	0	0	0	0
7/22	0	0	0	0	c	0	3	0	0	0	0	0
7/23	0	0	0	0	c	0	3	0	0	0	0	0
7/24	0	1	0 b	0	c	0	4	0	0	0	0	0
7/25	1	0	0 b	0	c	1	4	0	0	0	0	0
7/26	0	0	0	0	c	1	4	0	0	0	0	0
7/27	1 a	0	0 b	3	c	2	4	0	3	0	0	0
7/28	2	3	1	3	c	4	7	1	6	0	0	0
7/29	9	2	0	3	c	13	9	1	9	0	0	0
7/30	1	25	8	8	c	14	34	9	17	0	0	0
7/31	1	11	18 b	3	c	15	45	27	20	0	0	0
8/01	0	40	42 b	5	c	15	85	69	25	0	1	0
8/02	0	110 b	29 b	11	c	15	195	98	36	0	1	0
8/03	0	172	17 b	16	c	15	367	114	52	0	1	0
8/04	0	215	42	4	c	15	582	156	56	0	1	0
8/05	2	173	91	33	c	17	755	247	89	0	2	1
8/06	0	129	47	23	c	17	884	294	112	0	3	1
8/07	5	277	74	46	c	22	1,161	368	158	1	4	1
8/08	1	108	135	43	c	23	1,269	503	201	1	5	2
8/09	1	267	130	79	c	24	1,536	633	280	1	6	2
8/10	3 b	619	264	73	c	27	2,155	897	353	1	9	3
8/11	5 b	730	212	63	c	32	2,885	1,109	416	1	11	4
8/12	2 b	1,123	306	437	c	33	4,008	1,415	853	1	13	8
8/13	9 b	1,429	314	787	c	42	5,437	1,729	1,640	1	16	14

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Table 3. (page 2 of 2)

	Daily Passage					Cumulative Passage				Percent Passage		
Date	1999	2000	2001	2002	2003	1999	2000	2001	2002	1999	2001	2002
8/14	12 b	319 d	864	240	c	54	5,756	2,593	1,880	2	25	17
8/15	13 b	c	530	220	c	67		3,123	2,100	2	30	18
8/16	27 b	c	860	345	c	94		3,983	2,445	3	38	22
8/17	37 b	c	652 b	53	c	129		4,635	2,498	4	44	22
8/18	45 b	c	610 b	349	c	173		5,245	2,847	5	50	25
8/19	26 b	c	567 b	27	c	199		5,812	2,874	6	55	25
8/20	72 b	c	525 b	28	c	270		6,337	2,902	8	60	26
8/21	75 b	c	482 b	1199	c	343		6,819	4,101	10	65	36
8/22	33 b	c	439 b	420	c	375		7,258	4,521	11	69	40
8/23	57 b	c	397 b	1347	c	446		7,655	5,868	13	73	52
8/24	103	c	354 b	1027	c	549		8,009	6,895	16	76	61
8/25	88	c	311 b	542	c	637		8,320	7,437	18	79	65
8/26	93 a	c	269 b	750	c	730		8,589	8,187	21	82	72
8/27	97	c	226 b	354	c	827		8,815	8,541	24	84	75
8/28	181	c	185	345	c	1,008		9,000	8,886	29	86	78
8/29	171	c	182	106	c	1,179		9,182	8,992	34	87	79
8/30	93	c	204	52	c	1,272		9,386	9,044	37	89	80
8/31	184	c	176	368	c	1,456		9,562	9,412	42	91	83
9/01	239	c	64	409	c	1,695		9,626	9,821	49	92	86
9/02	170	c	87	225	c	1,865		9,713	10,046	54	92	88
9/03	140	c	107	92	c	2,005		9,820	10,138	58	94	89
9/04	190	c	88	182	c	2,195		9,908	10,320	64	94	91
9/05	193	c	80	201	c	2,388		9,988	10,521	69	95	93
9/06	103	c	33	79	c	2,491		10,021	10,600	72	95	93
9/07	30	c	43	253	c	2,521		10,064	10,853	73	96	96
9/08	35	c	55	40	c	2,556		10,119	10,893	74	96	96
9/09	53	c	38	62	c	2,609		10,157	10,955	76	97	96
9/10	303	c	13	54	c	2,912		10,170	11,009	84	97	97
9/11	81	c	61	53	c	2,993		10,231	11,062	87	97	97
9/12	81	c	29	51 e	c	3,074		10,260	11,113	89	98	98
9/13	99	c	30	45 b	c	3,173		10,290	11,158	92	98	98
9/14	82	c	38	40 b	c	3,255		10,328	11,198	94	98	99
9/15	51	c	56	36 b	c	3,306		10,384	11,234	96	99	99
9/16	26	c	39 b	31 b	c	3,332		10,423	11,265	96	99	99
9/17	32	c	31 b	27 b	c	3,364		10,454	11,292	97	100	99
9/18	18	c	24 b	22 b	c	3,382		10,478	11,314	98	100	100
9/19	56	c	16 b	18 b	c	3,438		10,493	11,332	100	100	100
9/20	17	c	8 b	13 e	c	3,455		10,501	11,345	100	100	100
Total	3,455	5,756	10,501	11,345	0							
Obs.	2,967	5,646	5,669	11,132	n.a.							
Est. (%)	14.1	1.9	46.0	2.0	n.a.							

a = Daily passage was estimated due to the occurance of a hole in the weir.
b = The weir was not operational; daily passage was estimated.
c = The weir was not operational; daily passage was not estimated.
d = Partial day count, passage was not estimated.
e = Partial day count, passage was estimated.

Table 4. Historical daily sockeye and pink salmon passage at the Tatlawiksuk River weir.

	Sockeye						Pink					
Date	1998	1999	2000	2001	2002	2003	1998	1999	2000	2001	2002	2003
6/15	c	0	0	c	c	c	c	0	0	c	c	c
6/16	c	0	0	c	c	c	c	0	0	c	c	c
6/17	c	0	0	c	0 e	c	c	0	0	c	0 e	c
6/18	0	0	0	c	0	c	0	0	0	c	0	c
6/19	0	0	0	c	0	c	0	0	0	c	0	c
6/20	0	0	0	0	0	0	0	0	0	0	0	0
6/21	0	0	0	1	0	0	0	0	0	0	0	0
6/22	0	0	0	0	0	0	0	0	0	0	0	0
6/23	0	0	0	0	0	0	0	0	0	0	0	0
6/24	0	0	0	0	0	0	0	0	0	0	0	0
6/25	0	0	0	0	0	0	0	0	0	0	0	0
6/26	0	0	0	0	0	0	0	0	0	0	0	0
6/27	0	0	0	0	0	0	0	0	0	0	0	0
6/28	0	0	0	0	0	0	0	0	0	1	0	0
6/29	0	0	0	0	0	0	0	0	0	0	0	0
6/30	0	0	0	0	0	0	0	0	0	0	0	0
7/01	0	0	0	0	0	0	0	0	0	0	0	0
7/02	0	0	0	0	0	0	0	0	0	0	0	0
7/03	0	0	0	0	0	c	0	0	0	0	0	c
7/04	0	0	0	0	0	c	0	0	0	0	0	c
7/05	0	0	0	0	0	c	0	0	0	0	0	c
7/06	0	0	0	0	0	c	0	0	0	0	1	c
7/07	0	0	0	0	0	c	0	0	0	0	0	c
7/08	c	0	0	0	0	c	c	0	0	0	0	c
7/09	c	0	0	0	0	c	c	0	0	0	0	c
7/10	c	0	0	0	0	c	c	0	0	0	0	c
7/11	c	0 a	0	0	0	c	c	0 a	0	0	0	c
7/12	c	0	0	0	0	c	c	0	0	0	0	c
7/13	c	0	0	1	0	c	c	0	0	0	0	c
7/14	c	0	0	1	0	c	c	0	0	0	0	c
7/15	c	0	0	0	0	c	c	0	0	0	0	c
7/16	c	0	0	0	0	c	c	0	0	0	0	c
7/17	c	0	0	0	0	c	c	0	0	0	0	c
7/18	c	0	0	0	0	c	c	0	0	0	0	c
7/19	c	0	0	0	0	c	c	0	0	0	0	c
7/20	c	0	0	0	0	c	c	0	0	0	0	c
7/21	c	0	0	0	0	c	c	0	0	0	0	c
7/22	c	0	0	0	0	c	c	0	0	0	0	c
7/23	c	0	0	0	0	c	c	0	0	0	0	c
7/24	c	0	0	0 b	0	c	c	0	0	0 b	0	c
7/25	c	0	0	0 b	0	c	c	0	0	0 b	0	c
7/26	c	0	0	0	0	c	c	0	0	0	0	c
7/27	c	1 a	0	0 b	0	c	c	0 a	0	0 b	0	c
7/28	c	2	0	0	0	c	c	0	0	0	0	c
7/29	c	0	0	0	0	c	c	0	0	0	0	c
7/30	c	0	0	0	0	c	c	0	0	0	0	c
7/31	c	0	0	0 b	0	c	c	0	0	0 b	0	c
8/01	c	0	0	0 b	0	c	c	0	0	0 b	0	c
8/02	c	0	0	0 b	0	c	c	0	0 b	0 b	0	c
8/03	c	2	0	0 b	0	c	c	0	0	0 b	0	c
8/04	c	0	0	0	0	c	c	0	0	0	0	c
8/05	c	0	0	0	0	c	c	0	0	1	0	c
8/06	c	0	0	0	0	c	c	0	0	0	0	c
8/07	c	0	0	0	0	c	c	0	0	0	0	c
8/08	c	0	0	0	0	c	c	0	0	0	0	c
8/09	c	0	0	0	0	c	c	1	0	0	0	c
8/10	c	0 b	0	0	0	c	c	0 b	0	0	0	c

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Table 4. (page 2 of 2)

	Sockeye						Pink					
Date	1998	1999	2000	2001	2002	2003	1998	1999	2000	2001	2002	2003
8/11	c	0 b	0	0	0	c	c	0 b	0	0	0	c
8/12	c	0 b	0	0	0	c	c	0 b	0	0	0	c
8/13	c	0 b	0	0	0	c	c	0 b	0	0	0	c
8/14	c	0 b	0 d	0	0	c	c	0 b	0 d	0	0	c
8/15	c	0 b	c	0	0	c	c	0 b	c	0	0	c
8/16	c	0 b	c	0	0	c	c	0 b	c	0	0	c
8/17	c	0 b	c	0 b	0	c	c	0 b	c	0 b	0	c
8/18	c	0 b	c	0 b	0	c	c	0 b	c	0 b	0	c
8/19	c	0 b	c	0 b	0	c	c	0 b	c	0 b	0	c
8/20	c	0 b	c	0 b	0	c	c	0 b	c	0 b	0	c
8/21	c	0 b	c	0 b	0	c	c	0 b	c	0 b	0	c
8/22	c	0 b	c	0 b	0	c	c	0 b	c	0 b	0	c
8/23	c	0 b	c	0 b	0	c	c	0 b	c	0 b	0	c
8/24	c	0	c	0 b	0	c	c	0	c	0 b	0	c
8/25	c	0	c	0 b	0	c	c	0	c	0 b	0	c
8/26	c	0 a	c	0 b	0	c	c	0 a	c	0 b	0	c
8/27	c	0	c	0 b	0	c	c	0	c	0 b	0	c
8/28	c	0	c	0	0	c	c	0	c	0	0	c
8/29	c	0	c	0	1	c	c	0	c	0	0	c
8/30	c	0	c	0	0	c	c	0	c	0	0	c
8/31	c	0	c	0	0	c	c	0	c	0	0	c
9/01	c	0	c	0	0	c	c	0	c	0	0	c
9/02	c	1	c	0	0	c	c	0	c	0	0	c
9/03	c	0	c	0	0	c	c	0	c	0	0	c
9/04	c	0	c	0	0	c	c	0	c	0	0	c
9/05	c	0	c	0	0	c	c	0	c	0	0	c
9/06	c	0	c	0	0	c	c	0	c	0	0	c
9/07	c	0	c	0	0	c	c	0	c	0	0	c
9/08	c	0	c	0	0	c	c	0	c	0	0	c
9/09	c	0	c	0	0	c	c	0	c	0	0	c
9/10	c	0	c	0	0	c	c	0	c	0	0	c
9/11	c	0	c	0	0	c	c	0	c	0	0	c
9/12	c	0	c	0	0 e	c	c	0	c	0	0 e	c
9/13	c	0	c	0	0 b	c	c	0	c	0	0 b	c
9/14	c	0	c	0	0 b	c	c	0	c	0	0 b	c
9/15	c	0	c	0	0 b	c	c	0	c	0	0 b	c
9/16	c	0	c	c	0 b	c	c	0	c	c	0 b	c
9/17	c	0	c	c	0 b	c	c	0	c	c	0 b	c
9/18	c	0	c	c	0 b	c	c	0	c	c	0 b	c
9/19	c	0	c	c	0 b	c	c	0	c	c	0 b	c
9/20	c	0	c	c	0 e	c	c	0	c	c	0 e	c
Total	0	6	0	3	1	0	0	1	0	3	1	0
Obs.	0	5	0	3	1	n.a.	0	1	0	3	1	n.a.
Est. (%)	0.0	16.7	0.0	0.0	0.0	n.a.	0.0	0.0	0.0	0.0	0.0	n.a.

a = Daily passage was estimated due to the occurance of a hole in the weir.
b = The weir was not operational; daily passage was estimated.
c = The weir was not operational; daily passage was not estimated
d = Partial day count, passage was not estimated.
e = Partial day count, passage was estimated.

Table 5. Historical longnose sucker passage at the Tatlawiksuk River weir.

Date	Daily						Cumulative						Percent Passage			
	1998	1999	2000	2001	2002	2003	1998	1999	2000	2001	2002	2003	1999	2000	2001	2002
6/15	c	1,380	3	c	c	c		1,380	3				27	0		
6/16	c	757	1	c	c	c		2,137	4				42	0		
6/17	c	277	122	c	84 d	c		2,414	126		84		47	12		7
6/18	67	291	35	c	59	c	67	2,705	161		143		53	15		12
6/19	151	263	36	c	41	c	218	2,968	197		184		58	19		16
6/20	43	101	3	302	9	5	261	3,069	200	302	193	5	60	19	11	17
6/21	24	71	12	253	49	3	285	3,140	212	555	242	8	62	20	21	21
6/22	23	5	159	164	122	1	308	3,145	371	719	364	9	62	35	27	32
6/23	327	325	154	392	194	14	635	3,470	525	1,111	558	23	68	50	41	48
6/24	108	500	198	439	21	7	743	3,970	723	1,550	579	30	78	69	57	50
6/25	215	115	51	194	32	4	958	4,085	774	1,744	611	34	80	74	65	53
6/26	290	183	55	116	3	3	1,248	4,268	829	1,860	614	37	84	79	69	53
6/27	517	124	12	63	3	1	1,765	4,392	841	1,923	617	38	86	80	71	53
6/28	359	93	18	17	2	10	2,124	4,485	859	1,940	619	48	88	82	72	54
6/29	245	82	0	25	20	1	2,369	4,567	859	1,965	639	49	90	82	73	55
6/30	133	86	0	76	0	6	2,502	4,653	859	2,041	639	55	91	82	76	55
7/01	61	159	5	64	17	0	2,563	4,812	864	2,105	656	55	94	82	78	57
7/02	130	25	19	21	48	0	2,693	4,837	883	2,126	704	55	95	84	79	61
7/03	215	28	116	24	24	c	2,908	4,865	999	2,150	728		96	95	80	63
7/04	155	12	36	7	51	c	3,063	4,877	1,035	2,157	779		96	98	80	67
7/05	127	53	0	3	43	c	3,190	4,930	1,035	2,160	822		97	98	80	71
7/06	55	56	1	4	84	c	3,245	4,986	1,036	2,164	906		98	98	80	78
7/07	1 d	14	0	7	36	c	3,246	5,000	1,036	2,171	942		98	98	80	82
7/08	c	19	0	4	21	c		5,019	1,036	2,175	963		99	98	81	83
7/09	c	11	2	30	21	c		5,030	1,038	2,205	984		99	99	82	85
7/10	c	6	0	12	49	c		5,036	1,038	2,217	1,033		99	99	82	89
7/11	c	17 a	1	4	17	c		5,053	1,039	2,221	1,050		99	99	82	91
7/12	c	1	9	26	3	c		5,054	1,048	2,247	1,053		99	100	83	91
7/13	c	2	4	101	4	c		5,056	1,052	2,348	1,057		99	100	87	92
7/14	c	1	0	49	1	c		5,057	1,052	2,397	1,058		99	100	89	92
7/15	c	8	0	49	4	c		5,065	1,052	2,446	1,062		99	100	91	92
7/16	c	16	0	3	18	c		5,081	1,052	2,449	1,080		100	100	91	94
7/17	c	0	0	7	27	c		5,081	1,052	2,456	1,107		100	100	91	96
7/18	c	1	0	41	1	c		5,082	1,052	2,497	1,108		100	100	92	96
7/19	c	3	0	15	0	c		5,085	1,052	2,512	1,108		100	100	93	96
7/20	c	4	0	27	2	c		5,089	1,052	2,539	1,110		100	100	94	96
7/21	c	1	0	23	3	c		5,090	1,052	2,562	1,113		100	100	95	96
7/22	c	0	0	30	0	c		5,090	1,052	2,592	1,113		100	100	96	96
7/23	c	0	0	33	1	c		5,090	1,052	2,625	1,114		100	100	97	96
7/24	c	0	0	21 b	1	c		5,090	1,052	2,646	1,115		100	100	98	97
7/25	c	0	0	11 b	1	c		5,090	1,052	2,658	1,116		100	100	98	97
7/26	c	0	0	1	1	c		5,090	1,052	2,659	1,117		100	100	98	97
7/27	c	0 a	0	2 b	0	c		5,090	1,052	2,661	1,117		100	100	99	97
7/28	c	0	0	4	0	c		5,090	1,052	2,665	1,117		100	100	99	97
7/29	c	0	0	1	0	c		5,090	1,052	2,666	1,117		100	100	99	97
7/30	c	0	0	2	1	c		5,090	1,052	2,668	1,118		100	100	99	97
7/31	c	0	0	9 b	2	c		5,090	1,052	2,676	1,120		100	100	99	97
8/01	c	0	0	4 b	3	c		5,090	1,052	2,680	1,123		100	100	99	97
8/02	c	0	0	7 b	6	c		5,090	1,052	2,687	1,129		100	100	100	98
8/03	c	0	0	6 b	0	c		5,090	1,052	2,694	1,129		100	100	100	98
8/04	c	0	0	8	0	c		5,090	1,052	2,702	1,129		100	100	100	98
8/05	c	0	0	3	0	c		5,090	1,052	2,705	1,129		100	100	100	98
8/06	c	0	0	1	0	c		5,090	1,052	2,706	1,129		100	100	100	98
8/07	c	0	0	1	0	c		5,090	1,052	2,707	1,129		100	100	100	98
8/08	c	0	0	2	0	c		5,090	1,052	2,709	1,129		100	100	100	98
8/09	c	0	0	2	0	c		5,090	1,052	2,711	1,129		100	100	100	98
8/10	c	0 b	0	1	0	c		5,090	1,052	2,712	1,129		100	100	100	98
8/11	c	0 b	0	0	0	c		5,090	1,052	2,712	1,129		100	100	100	98
8/12	c	0 b	0	1	2	c		5,090	1,052	2,713	1,131		100	100	100	98
8/13	c	0 b	0	5	0	c		5,090	1,052	2,718	1,131		100	100	100	98
8/14	c	0 b	0 d	2	0	c		5,090		2,720	1,131		100		100	98
8/15	c	0 b	c	25	0	c		5,090		2,745	1,131		100		100	98
8/16	c	0 b	c	25	0	c		5,090		2,770	1,131		100		100	98
8/17	c	0 b	c	23 b	0	c		5,090		2,792	1,131		100		100	98
8/18	c	0 b	c	21 b	0	c		5,090		2,813	1,131		100		100	98
8/19	c	0 b	c	19 b	0	c		5,090		2,832	1,131		100		100	98
8/20	c	0 b	c	17 b	0	c		5,090		2,849	1,131		100		100	98
8/21	c	0 b	c	15 b	0	c		5,090		2,864	1,131		100		100	98
8/22	c	0 b	c	13 b	10	c		5,090		2,877	1,141		100		100	99
8/23	c	0 b	c	11 b	3	c		5,090		2,887	1,144		100		100	99
8/24	c	0	c	9 b	1	c		5,090		2,896	1,145		100		100	99
8/25	c	0	c	7 b	0	c		5,090		2,903	1,145		100		100	99
8/26	c	0 a	c	5 b	1	c		5,090		2,907	1,146		100		100	99
8/27	c	0	c	3 b	1	c		5,090		2,910	1,147		100		100	99
8/28	c	0	c	0	3	c		5,090		2,910	1,150		100		100	100
8/29	c	0	c	1	1	c		5,090		2,911	1,151		100		100	100
8/30	c	0	c	0	0	c		5,090		2,911	1,151		100		100	100
8/31	c	0	c	0	0	c		5,090		2,911	1,151		100		100	100

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Table 5. (page 2 of 2)

Date	Daily						Cumulative						Percent Passage			
	1998	1999	2000	2001	2002	2003	1998	1999	2000	2001	2002	2003	1999	2000	2001	2002
9/01	c	0	c	1	0	c		5,090		2,912	1,151		100		100	100
9/02	c	0	c	0	0	c		5,090		2,912	1,151		100		100	100
9/03	c	0	c	0	0	c		5,090		2,912	1,151		100		100	100
9/04	c	1	c	0	0	c		5,091		2,912	1,151		100		100	100
9/05	c	1	c	0	2	c		5,092		2,912	1,153		100		100	100
9/06	c	1	c	0	1	c		5,093		2,912	1,154		100		100	100
9/07	c	0	c	0	1	c		5,093		2,912	1,155		100		100	100
9/08	c	0	c	0	0	c		5,093		2,912	1,155		100		100	100
9/09	c	0	c	0	0	c		5,093		2,912	1,155		100		100	100
9/10	c	0	c	0	0	c		5,093		2,912	1,155		100		100	100
9/11	c	0	c	2	0	c		5,093		2,914	1,155		100		100	100
9/12	c	0	c	0	0 e	c		5,093		2,914	1,155		100		100	100
9/13	c	0	c	0	0 b	c		5,093		2,914	1,155		100		100	100
9/14	c	0	c	0	0 b	c		5,093		2,914	1,155		100		100	100
9/15	c	0	c	2	0 b	c		5,093		2,916	1,155		100		100	100
9/16	c	0	c	c	0 b	c		5,093		2,916	1,155		100		100	100
9/17	c	0	c	c	0 b	c		5,093		2,916	1,155		100		100	100
9/18	c	0	c	c	0 b	c		5,093		2,916	1,155		100		100	100
9/19	c	0	c	c	0 b	c		5,093		2,916	1,155		100		100	100
9/20	c	0	c	c	0 e	c		5,093		2,916	1,155		100		100	100
Total	3,246	5,093	1,052	2,916	1,155	55										
Obs.	3,246	5,093	1,052	2,733	1,155	55										
Est. (%)	0.0	0.0	0.0	6.3	0.0	0.0										

a = Daily passage was estimated due to the occurance of a hole in the weir.
b = The weir was not operational; daily passage was estimated.
c = The weir was not operational; daily passage was not estimated
d = Partial day count, passage was not estimated.
e = Partial day count, passage was estimated.

Table 6. Age and sex of chinook salmon at the Tatlawiksuk River weir based on escapement samples collected with a fish trap, 1998 through 2003.[ab]

Year	Sample Dates (Stratum Dates)	Sample Size	Sex	1.2 (4) Esc.	1.2 (4) %	1.3 (5) Esc.	1.3 (5) %	2.2 (5) Esc.	2.2 (5) %	1.4 (6) Esc.	1.4 (6) %	1.5 (7) Esc.	1.5 (7) %	Total Esc.	Total %
1998[c]	7/1, 7	15	M		0.0		66.7		0.0		6.7		0.0		73.3
			F		0.0		20.0		0.0		6.6		0.0		26.7
			Total		0.0		86.7		0.0		13.3		0.0		100.0
1999[d]	Entire Run	7	M		0.0		14.3		0.0		42.9		0.0		57.1
			F		0.0		0.0		0.0		42.8		0.0		42.9
			Total		0.0		14.3		0.0		85.7		0.0	1,490	100.0
2000[d]	7/6, 13, 16, 21	7	M		14.3		14.3		0.0		42.8		0.0		57.1
			F		0.0		0.0		0.0		28.6		0.0		42.9
			Total		14.3		14.3		0.0		71.4		0.0	817	100.0
2001[d]	6/30, 7/2-3, 5, 8	34	M		14.7		55.9		0.0		8.8		0.0		79.4
			F		0.0		2.9		0.0		17.7		0.0		20.6
			Subtotal		14.7		14.3		0.0		26.5		0.0		100.0
	7/11-14, 16, 19	40	M		10.0		20.0		0.0		15.0		0.0		45.0
			F		0.0		2.5		0.0		45.0		7.5		55.0
			Subtotal		10.0		14.3		0.0		60.0		0.0		100.0
	Season	74	M		12.2		36.5		0.0		12.2		0.0		60.8
			F		0.0		2.7		0.0		32.4		4.1		39.2
			Total		12.2		39.2		0.0		44.6		4.1	2,011	100.0
2002	6/26 - 30 (6/15 - 30)	86	M	200	23.3	90	10.5	10	1.2	230	26.7	10	1.2	539	62.8
			F	0	0.0	20	2.3	0	0.0	269	31.4	30	3.5	319	37.2
			Subtotal	200	23.3	110	12.8	10	1.2	499	58.1	40	4.7	858	100.0
	7/1 - 4 (7/1 - 6)	73	M	224	30.1	163	21.9	0	0.0	153	20.5	10	1.4	550	74.0
			F	0	0.0	0	0.0	0	0.0	183	24.7	10	1.3	194	26.0
			Subtotal	224	30.1	163	21.9	0	0.0	336	45.2	20	2.7	744	100.0
	7/8 - 14 (7/7 - 15)	62	M	60	14.5	81	19.4	0	0.0	74	17.7	0	0.0	215	51.6
			F	7	1.6	27	6.4	0	0.0	155	37.1	13	3.2	202	48.4
			Subtotal	67	16.1	108	25.8	0	0.0	229	54.8	13	3.2	417	100.0
	7/16 - 21, 23 - 25, 30, 8/1 (7/16 - 9/22)	58	M	26	12.1	41	19.0	0	0.0	37	17.3	0	0.0	108	50.0
			F	0	0.0	19	8.6	0	0.0	82	37.9	7	3.4	108	50.0
			Subtotal	26	12.1	60	27.6	0	0.0	119	55.2	7	3.4	216	100.0
	Season	279	M	510	22.8	375	16.8	10	0.4	494	22.1	20	0.9	1,412	63.2
			F	7	0.3	65	2.9	0	0.0	689	30.8	61	2.7	823	36.8
			Total	518	23.2	441	19.7	10	0.4	1,183	52.9	81	3.6	2,235	100.0
2003	6/30 - 7/02	39	M	3	7.7	14	35.9	0	0.0	5	12.8	2	5.1	24	61.5
			F	0	0.0	8	20.5	0	0.0	6	15.4	1	2.6	15	38.5
			Subtotal	3	7.7	22	56.4	0	0.0	11	28.2	3	7.7	39	100.0
	Season	39	M	3	7.7	14	35.9	0		5	12.8	2	5.1	24	61.5
			F	0	0.0	8	20.5	0	0.0	6	15.4	1	2.6	15	38.5
			Total	3	7.7	22	56.4	0	0.0	11	28.2	3	7.7	39	100.0

[a] The number of fish in each stratum age and sex category are derived from the sample percentages; discrepancies in sums are attributed to rounding errors.

[b] The number of fish in "Season" summaries are the strata sums; "Season" percentages are derived from the sums.

[c] ASL composition of escapement was not estimated because of the premature termination of the project.

[d] Sample dates and sample sizes do not meet criteria for estimating escapement percentages for some or all of the strata.

Table 7. Mean length (mm) of chinook salmon at the Tatlawiksuk River weir based on escapement samples collected with a fish trap, 1998 through 2003. [a]

Year	Sample Dates	Sex		Age Class 1.2 (4)	1.3 (5)	2.2 (5)	1.4 (6)	1.5 (7)
1998[b]	7/1, 7	M	Mean Length		728		789	
			Std. Error		33		-	
			Range		575- 879		789- 789	
			Sample Size	0	10	0	1	0
		F	Mean Length		705		697	
			Std. Error		13		-	
			Range		681- 725		697- 697	
			Sample Size	0	3	0	1	0
1999[c]	Entire Season	M	Mean Length		690		863	
			Std. Error		-		45	
			Range		690-690		775-925	
			Sample Size	0	1	0	3	0
		F	Mean Length				894	
			Std. Error				6	
			Range				885-905	
			Sample Size	0	0	0	3	0
2000[c]	7/6, 13, 16, 21	M	Mean Length	540	795		740	
			Std. Error	-	-		20	
			Range	540- 540	795-795		715- 780	
			Sample Size	1	1	0	3	0
		F	Mean Length				730	
			Std. Error				40	
			Range				690- 770	
			Sample Size	0	0	0	2	0
2001[c]	6/30, 7/2-3, 5, 8	M	Mean Length	530	675		800	
			Std. Error	24	13		8	
			Range	455-605	580-760		790- 815	
			Sample Size	5	19	0	3	0
		F	Mean Length		818		830	
			Std. Error		-		35	
			Range		818- 818		744- 936	
			Sample Size	0	1	0	6	0
	7/11-14, 16, 19	M	Mean Length	525	686		772	
			Std. Error	7	19		23	
			Range	515-546	602- 767		699- 860	
			Sample Size	4	8	0	6	0

-Continued-

Table 7. (page 2 of 3)

Year	Sample Dates	Sex		Age Class 1.2 (4)	1.3 (5)	2.2 (5)	1.4 (6)	1.5 (7)
2001[c] (cont.)		F	Mean Length		752		819	955
			Std. Error		-		16	48
			Range		752- 752		740- 935	859- 1010
			Sample Size	0	1	0	18	3
	Season	M	Mean Length	528	678		781	
			Std. Error	14	11		16	
			Range	455-605	580- 767		699- 860	
			Sample Size	9	27	0	9	0
		F	Mean Length		785		821	955
			Std. Error		-		15	48
			Range		752- 818		740- 936	859- 1010
			Sample Size	0	2	0	24	3
2002	6/26 - 30 (6/15 - 30)	M	Mean Length	578	693	532	751	804
			Std Error	8	15		17	-
			Range	536-674	622-777	532-532	657-972	804-804
			Sample Size	20	9	1	23	1
		F	Mean Length		638		780	881
			Std Error		16		14	71
			Range		622-653		687-915	742-970
			Sample Size	0	2	0	27	3
	7/1 - 4 (7/1 - 6)	M	Mean Length	557	694		753	846
			Std Error	6	15		20	-
			Range	510-651	596-802		677-908	846-846
			Sample Size	22	16	0	15	1
		F	Mean Length				788	836
			Std Error				17	-
			Range				658-925	836-836
			Sample Size	0	0	0	18	1
	7/8 - 14 (7/7 - 15)	M	Mean Length	555	691		739	
			Std Error	23	20		22	
			Range	453-661	543-764		673 940	
			Sample Size	9	12	0	11	0
		F	Mean Length	587	691		784	934
			Std Error	-	25		12	81
			Range	587-587	625-735		689-874	853-1015
			Sample Size	1	4	0	23	2

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Table 7. (page 3 of 3)

Year	Sample Dates	Sex		Age Class 1.2 (4)	1.3 (5)	2.2 (5)	1.4 (6)	1.5 (7)
2002	7/16 - 21, 23 - 25,	M	Mean Length	566	673		812	
(cont.)	30, 8/1		Std Error	16	18		34	
	(7/16 - 9/22)		Range	509-611	557-747		566-964	
			Sample Size	7	11	0	10	0
		F	Mean Length		762		837	893
			Std Error		29		15	57
			Range		717-876		689-930	836-950
			Sample Size	0	5	0	22	2
	Season	M	Mean Length	566	691	532	754	825
			Range	453-674	543-802	532-532	566-972	804-846
			Sample Size	58	48	1	59	2
		F	Mean Length	587	695		790	887
			Range	587-587	622-876		658-930	742-1015
			Sample Size	1	11	0	90	8
2003	6/30 - 7/02	M	Mean Length	525	733		847	956
			Std Error	30	12		22	65
			Range	483- 583	662- 826		794- 923	891- 1020
			Sample Size	3	14	0	5	2
		F	Mean Length		744		844	817
			Std Error		6		27	-
			Range		718- 762		764- 933	817- 817
			Sample Size	0	8	0	6	1
	Season	M	Mean Length	525	733		847	956
			Range	483- 583	662- 826		794- 923	891- 1020
			Sample Size	3	14	0	5	2
		F	Mean Length		744		844	817
			Range		718- 762		764- 933	817- 817
			Sample Size	0	8	0	6	1

[a] "Season" mean lengths are weighted by the escapement passage in each stratum.

[b] ASL composition of escapement was not estimated because of the premature termination of the project.

[c] Sample dates and sample sizes do not meet criteria for estimating escapement percentages for some or all of the strata.

Table 8. Age and sex of chum salmon at the Tatlawiksuk River weir based on escapement samples collected with a fish trap, 1998 through 2003.[ab]

Year	Sample Dates (Stratum Dates)	Sample Size	Sex	Age Class 0.2 (3) Esc.	0.2 (3) %	0.3 (4) Esc.	0.3 (4) %	0.4 (5) Esc.	0.4 (5) %	0.5 (6) Esc.	0.5 (6) %	Total Esc.	Total %
1998 [c]	6/29 - 7/1	166	M		0.0		50.0		13.3		0.6		63.9
			F		0.0		30.7		5.4		0.0		36.1
			Subtotal		0.0		80.7		18.7		0.6		100.0
	7/6 - 7	164	M		0.0		48.8		11.0		0.0		59.8
			F		0.0		39.0		1.2		0.0		40.2
			Subtotal		0.0		87.8		12.2		0.0		100.0
1999	7/9 - 11	193	M	0	0.0	1,004	33.2	659	21.8	16	0.5	1,678	55.4
	(6/24 - 7/13)		F	0	0.0	800	26.4	549	18.1	0	0.0	1,349	44.6
			Subtotal	0	0.0	1,804	59.6	1,208	39.9	16	0.5	3,027	100.0
	7/16 - 17	194	M	0	0.0	738	38.6	374	19.6	0	0.0	1,112	58.2
	(7/14 - 19)		F	10	0.5	630	33.0	157	8.2	0	0.0	797	41.8
			Subtotal	10	0.5	1,368	71.6	531	27.8	0	0.0	1,909	100.0
	7/21 - 22	195	M	0	0.0	551	25.1	236	10.8	0	0.0	788	35.9
	(7/20 - 24)		F	0	0.0	1,125	51.3	282	12.8	0	0.0	1,406	64.1
			Subtotal	0	0.0	1,676	76.4	518	23.6	0	0.0	2,194	100.0
	7/26 - 28	119	M	0	0.0	529	34.4	103	6.7	13	0.8	645	42.0
	(7/25 - 31)		F	0	0.0	696	45.4	194	12.6	0	0.0	890	58.0
			Subtotal	0	0.0	1,225	79.8	297	19.3	13	0.8	1,535	100.0
	8/3 - 8/4	117	M	0	0.0	176	29.9	51	8.5	0	0.0	227	38.5
	(8/1 - 6)		F	0	0.0	327	55.6	35	6.0	0	0.0	362	61.5
			Subtotal	0	0.0	503	85.5	86	14.5	0	0.0	589	100.0
	8/9	38	M	0	0.0	99	28.9	10	2.7	0	0.0	99	31.6
	(8/7 - 9/6)		F	0	0.0	229	65.8	8	2.6	0	0.0	247	68.4
			Subtotal	0	0.0	328	94.7	18	5.3	0	0.0	346	100.0
	Season	856	M	0	0.0	3,097	32.3	1,433	14.8	29	0.3	4,549	47.4
			F	10	0.1	3,807	29.8	1,225	12.7	0	0.0	5,051	52.6
			Total	10	0.1	6,904	72.1	2,658	27.5	29	0.3	9,600	100.0
2000	6/25 - 26	41	M	0	0.0	39	14.7	143	53.6	0	0.0	182	68.3
	(6/15 - 30)		F	0	0.0	20	7.3	65	24.4	0	0.0	85	31.7
			Subtotal	0	0.0	59	22.0	208	78.0	0	0.0	267	100.0
	7/6, 10, 12- 13	133	M	28	0.8	1,040	27.8	1,012	27.1	0	0.0	2,080	55.6
	(7/1 - 13)		F	0	0.0	872	23.3	759	20.3	28	0.8	1,659	44.4
			Subtotal	28	0.8	1,912	51.1	1,771	47.4	28	0.8	3,739	100.0
	7/15 - 16	156	M	21	1.9	305	27.6	128	11.5	0	0.0	454	41.0
	(7/14-18)		F	0	0.0	468	42.3	184	16.7	0	0.0	652	59.0
			Subtotal	21	1.9	773	69.9	312	28.2	0	0.0	1,106	100.0
	7/21-22, 24	180	M	24	2.2	374	35.0	190	17.8	0	0.0	589	55.0
	(7/19 - 25)		F	6	0.6	339	31.7	131	12.2	6	0.6	481	45.0
			Subtotal	30	2.8	713	66.7	321	30.0	6	0.6	1,070	100.0
	7/28 - 30	195	M	40	5.1	224	26.2	75	7.2	0	0.0	301	38.5
	(7/26- 8/13)		F	20	2.6	369	44.6	133	14.3	0	0.0	482	61.5
			Subtotal	60	7.7	593	70.8	208	21.5	0	0.0	783	100.0

-Continued-

Table 8. (page 2 of 3)

Year	Sample Dates (Stratum Dates)	Sample Size	Sex	0.2 (3) Esc.	0.2 (3) %	0.3 (4) Esc.	0.3 (4) %	0.4 (5) Esc.	0.4 (5) %	0.5 (6) Esc.	0.5 (6) %	Total Esc.	Total %
2000 (cont.)	Season	705	M	113	1.6	1,983	28.2	1,549	21.9	0	0.0	3,645	51.8
			F	26	0.4	2,067	29.4	1,271	18.0	34	0.5	3,398	48.2
			Total	139	2.0	4,050	57.6	2,820	39.9	34	0.5	7,043	100.0
2001	6/29 - 30 (6/20 - 30)	62	M	0	0.0	140	14.5	389	40.3	0	0.0	529	54.8
			F	0	0.0	171	17.8	264	27.4	0	0.0	435	45.2
			Subtotal	0	0.0	311	32.3	653	67.7	0	0.0	964	100.0
	7/2 - 4 (7/1 - 6)	92	M	0	0.0	286	14.1	1,033	51.1	0	0.0	1,319	65.2
			F	0	0.0	220	10.9	484	23.9	0	0.0	703	34.8
			Subtotal	0	0.0	506	25.0	1,517	75.0	0	0.0	2,022	100.0
	7/9 - 11 (7/7 - 13)	138	M	0	0.0	1,855	26.1	1,031	14.5	52	0.7	2,938	41.3
			F	0	0.0	2,062	29.0	2,113	29.7	0	0.0	4,174	58.7
			Subtotal	0	0.0	3,917	55.1	3,144	44.2	52	0.7	7,112	100.0
	7/16 - 17 (7/14 - 20)	194	M	0	0.0	3,461	42.8	876	10.8	42	0.5	4,378	54.1
			F	0	0.0	2,752	34.0	959	11.9	0	0.0	3,711	45.9
			Subtotal	0	0.0	6,213	76.8	1,835	22.7	42	0.5	8,089	100.0
	7/23 (7/21 - 26)	64	M	50	1.6	1,249	39.1	250	7.8	0	0.0	1,549	48.4
			F	0	0.0	1,349	42.2	299	9.4	0	0.0	1,648	51.6
			Subtotal	50	1.6	2,598	81.3	549	17.2	0	0.0	3,197	100.0
	7/30 (7/27-8/1)	66	M	0	0.0	383	33.3	70	6.0	0	0.0	453	39.4
			F	35	3.0	575	50.0	87	7.6	0	0.0	696	60.6
			Subtotal	35	3.0	958	83.3	157	13.6	0	0.0	1,149	100.0
	8/4-8, 13-15 (8/2 - 9/15)	231	M	10	0.9	389	32.9	46	3.9	0	0.0	446	37.7
			F	5	0.4	692	58.4	41	3.5	0	0.0	738	62.3
			Subtotal	15	1.3	1,081	91.3	87	7.4	0	0.0	1,184	100.0
	Season	847	M	60	0.2	7,763	32.7	3,693	15.6	93	0.4	11,610	49.0
			F	40	0.2	7,819	33.0	4,248	17.9	0	0.0	12,107	51.0
			Total	100	0.4	15,582	65.7	7,941	33.5	93	0.4	23,717	100.0
2002	6/24 - 27 (6/15-29)	178	M	0	0.0	1,012	34.9	979	33.7	163	5.6	2,154	74.2
			F	16	0.6	375	12.9	294	10.1	65	2.3	750	25.8
			Subtotal	16	0.6	1,387	47.8	1,273	43.8	228	7.9	2,904	100.0
	7/2 - 4 (6/30-7/6)	199	M	0	0.0	1,960	30.7	1,093	17.1	32	0.5	3,085	48.2
			F	129	2.0	1,928	30.1	1,221	19.1	32	0.5	3,310	51.8
			Subtotal	129	2.0	3,888	60.8	2,314	36.2	64	1.0	6,395	100.0
	7/9 - 11 (7/7-13)	192	M	31	0.5	1,457	24.5	1,333	22.4	31	0.5	2,852	47.9
			F	217	3.7	1,922	32.3	961	16.1	0	0.0	3,100	52.1
			Subtotal	248	4.2	3,379	56.8	2,294	38.5	31	0.5	5,952	100.0
	7/16 - 18 (7/14-20)	220	M	151	2.7	1,456	26.4	828	15.0	0	0.0	2,434	44.1
			F	251	4.6	2,183	39.5	628	11.4	25	0.5	3,087	55.9
			Subtotal	402	7.3	3,639	65.9	1,456	26.4	25	0.5	5,521	100.0
	7/23 - 26 (7/21-28)	212	M	221	8.5	651	25.0	344	13.2	12	0.5	1,229	47.2
			F	234	9.0	824	31.6	320	12.3	0	0.0	1,376	52.8
			Subtotal	455	17.5	1,475	56.6	664	25.5	12	0.5	2,605	100.0

-Continued-

Table 8. (page 3 of 3)

Year	Sample Dates (Stratum Dates)	Sample Size	Sex	Age Class 0.2 (3) Esc.	0.2 (3) %	0.3 (4) Esc.	0.3 (4) %	0.4 (5) Esc.	0.4 (5) %	0.5 (6) Esc.	0.5 (6) %	Total Esc.	Total %
2002	7/30 - 8/1	188	M	67	10.6	145	22.9	31	4.8	0	0.0	243	38.3
(cont.)	(7/29-8/3)		F	105	16.5	236	37.2	47	7.4	3	0.5	391	61.7
			Subtotal	172	27.1	381	60.1	78	12.2	3	0.5	634	100.0
	8/5 - 8	157	M	88	16.6	81	15.3	30	5.7	0	0.0	200	37.6
	(8/4-9/20)		F	132	24.8	149	28.0	51	9.6	0	0.0	331	62.4
			Subtotal	220	41.4	230	43.3	81	15.3	0	0.0	531	100.0
	Season	1,346	M	558	2.3	6,762	27.6	4,637	18.9	238	1.0	12,196	49.7
			F	1,083	4.4	7,617	31.0	3,521	14.3	126	0.5	12,346	50.3
			Total	1,641	6.7	14,379	58.6	8,158	33.2	364	1.5	24,542	100.0
2003	6/30 - 7/02	57	M	0	0.0	37	64.9	6	10.5	2	3.5	45	78.9
			F	0	0.0	11	19.3	1	1.8	0	0.0	12	21.1
			Subtotal	0	0.0	48	84.2	7	12.3	2	3.5	57	100.0
	Season	57	M	0	0.0	37	64.9	6	10.5	2	3.5	45	78.9
			F	0	0.0	11	19.3	1	1.8	0	0.0	12	21.1
			Total	0	0.0	48	84.2	7	12.3	2	3.5	57	100.0
	Grand Total [d]	3,754	M	731	1.1	19,604	30.2	11,292	17.4	360	0.6	31,988	49.3
			F	1,159	1.8	21,327	32.9	10,248	15.8	160	0.2	32,893	50.7
			Total	1,890	2.9	40,931	63.1	21,540	33.2	520	0.8	64,881	100.0

[a] The number of fish in each stratum age and sex category are derived from the sample percentages; discrepancies in sums are attributed to rounding errors.

[b] The number of fish in "Season" summaries are the strata sums; "Season" percentages are derived from the sums.

[c] ASL composition of escapement was not estimated because of the premature termination of the project; results are excluded from the "Grand Total".

[d] The number of fish in the "Grand total" are the sums of the "Season" totals; percentages are derived from those sums.

Table 9. Mean length (mm) of chum salmon at the Tatlawiksuk River weir based on escapement samples collected with a fish trap, 1998 through 2003. [a]

Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2 (3)	0.3 (4)	0.4 (5)	0.5 (6)
1998[b]	6/29 - 7/1	M	Mean Length		594	610	608
			Std. Error		3	9	-
			Range		517- 661	534- 691	608- 608
			Sample Size	0	83	22	1
		F	Mean Length		562	588	
			Std. Error		3	8	
			Range		511- 606	551- 635	
			Sample Size	0	51	9	0
	7/6 - 7	M	Mean Length		588	614	
			Std. Error		3	5	
			Range		518- 679	585- 668	
			Sample Size	0	80	18	0
		F	Mean Length		555	571	
			Std. Error		2	12	
			Range		509- 595	559- 582	
			Sample Size	0	64	2	0
1999	7/9 - 11 (6/24 - 7/13)	M	Mean Length		588	608	581
			Std. Error		4	4	-
			Range		530- 660	540- 655	581- 581
			Sample Size	0	64	42	1
		F	Mean Length		556	565	
			Std. Error		4	6	
			Range		479- 614	510- 668	
			Sample Size	0	51	35	0
	7/16 - 17 (7/14 - 19)	M	Mean Length		588	604	
			Std. Error		4	5	
			Range		423- 697	530- 683	
			Sample Size	0	75	38	0
		F	Mean Length	530	565	583	
			Std. Error	-	4	6	
			Range	530- 530	500- 680	542- 620	
			Sample Size	1	64	16	0
	7/21 - 22 (7/20 - 24)	M	Mean Length		582	603	
			Std. Error		4	6	
			Range		520- 634	537- 660	
			Sample Size	0	49	21	0

-Continued-

Table 9. (page 2 of 7)

Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2 (3)	0.3 (4)	0.4 (5)	0.5 (6)
1999	7/21 - 22	F	Mean Length		554	570	
(cont.)	(7/20 - 24)		Std. Error		2	6	
	(cont.)		Range		500- 625	520- 633	
			Sample Size	0	100	25	0
	7/26 - 28	M	Mean Length		583	609	625
	(7/25 - 31)		Std. Error		4	9	-
			Range		545- 640	570- 640	625- 625
			Sample Size	0	41	8	1
		F	Mean Length		563	575	
			Std. Error		4	5	
			Range		500- 620	540- 618	
			Sample Size	0	54	15	0
	8/3 - 8/4	M	Mean Length		593	600	
	(8/1 - 6)		Std. Error		5	9	
			Range		535- 669	551- 634	
			Sample Size	0	35	10	0
		F	Mean Length		548	557	
			Std. Error		3	14	
			Range		496- 592	500- 610	
			Sample Size	0	65	7	0
	8/9	M	Mean Length		579	635	
	(8/8 - 9/6)		Std. Error		9	-	
			Range		535- 630	635- 635	
			Sample Size	0	11	1	0
		F	Mean Length		549	555	
			Std. Error		5	-	
			Range		480- 595	555- 555	
			Sample Size	0	25	1	0
	Season	M	Mean Length		586	606	601
			Range		423- 697	530- 683	581- 625
			Sample Size	0	275	120	2
		F	Mean Length	530	557	570	
			Range	530- 530	479- 680	500- 668	
			Sample Size	1	359	99	0
2000	6/25 - 26	M	Mean Length		598	627	
	(6/15 - 30)		Std. Error		12	5	
			Range		580- 655	590- 680	
			Sample Size	0	6	22	0

-Continued-

Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2 (3)	0.3 (4)	0.4 (5)	0.5 (6)
2000	6/25 - 26	F	Mean Length		577	588	
(cont.)	(6/15 - 30)		Std. Error		3	6	
	(cont.)		Range		570- 580	565- 625	
			Sample Size	0	3	10	0
	7/6, 10, 12- 13	M	Mean Length	560	586	613	
	(7/1 - 13)		Std. Error	-	4	5	
			Range	560- 560	535- 650	540- 660	
			Sample Size	1	37	36	0
		F	Mean Length		562	580	590
			Std. Error		7	8	-
			Range		455- 620	500- 675	590- 590
			Sample Size	0	31	27	1
	7/15 - 16	M	Mean Length	568	590	613	
	(7/14-18)		Std. Error	15	5	8	
			Range	540- 590	535- 680	550- 675	
			Sample Size	3	43	18	0
		F	Mean Length		552	571	
			Std. Error		4	4	
			Range		500- 670	530- 600	
			Sample Size	0	66	26	0
	7/21-22, 24	M	Mean Length	574	590	605	
	(7/19 - 25)		Std. Error	2	4	5	
			Range	570- 580	520- 680	550- 670	
			Sample Size	4	63	32	0
		F	Mean Length	520	557	562	590
			Std. Error	-	3	4	-
			Range	520- 520	490- 620	540- 600	590- 590
			Sample Size	1	57	22	1
	7/28 - 30	M	Mean Length	539	584	598	
	(7/26- 8/13)		Std. Error	9	4	11	
			Range	490- 590	500- 655	540- 670	
			Sample Size	10	51	14	0
		F	Mean Length	531	542	567	
			Std. Error	8	3	7	
			Range	515- 560	480- 610	480- 640	
			Sample Size	5	87	28	0
	Season	M	Mean Length	557	587	613	
			Range	490- 590	500- 680	540- 680	
			Sample Size	18	200	122	0

-Continued-

Table 9. (page 4 of 7)

Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2 (3)	0.3 (4)	0.4 (5)	0.5 (6)
2000	Season	F	Mean Length	528	555	576	590
(cont.)	(cont.)		Range	515- 560	455- 670	480- 675	590- 590
			Sample Size	6	244	113	2
2001	6/29 - 30	M	Mean Length		599	608	
	(6/20 - 30)		Std. Error		10	7	
			Range		560- 645	520- 680	
			Sample Size	0	9	25	0
		F	Mean Length		556	588	
			Std. Error		7	5	
			Range		505- 590	550- 625	
			Sample Size	0	11	17	0
	7/2 - 4	M	Mean Length		589	594	
	(7/1 - 6)		Std. Error		7	4	
			Range		556- 632	522- 687	
			Sample Size	0	13	47	0
		F	Mean Length		553	568	
			Std. Error		7	5	
			Range		512- 576	536- 615	
			Sample Size	0	10	22	0
	7/9 - 11	M	Mean Length		588	611	676
	(7/7 - 13)		Std. Error		5	6	-
			Range		540- 637	564- 657	676- 676
			Sample Size	0	36	20	1
		F	Mean Length		566	581	
			Std. Error		3	4	
			Range		529- 613	534- 626	
			Sample Size	0	40	41	0
	7/16 - 17	M	Mean Length		581	600	624
	(7/14 - 20)		Std. Error		3	8	-
			Range		489- 667	513- 656	624- 624
			Sample Size	0	83	21	1
		F	Mean Length		550	565	
			Std. Error		3	5	
			Range		488- 624	528- 611	
			Sample Size	0	66	23	0
	7/23	M	Mean Length	518	575	574	
	(7/21 - 26)		Std. Error	-	7	5	
			Range	518- 518	526- 646	558- 586	
			Sample Size	1	25	5	0

-Continued-

Table 9. (page 5 of 7)

Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2 (3)	0.3 (4)	0.4 (5)	0.5 (6)
2001	7/23	F	Mean Length		536	561	
(cont.)	(7/21 - 26)		Std. Error		5	8	
	(cont.)		Range		485- 587	544- 598	
			Sample Size	0	27	6	0
	7/30	M	Mean Length		573	551	
	(7/27-8/1)		Std. Error		5	7	
			Range		527- 614	533- 566	
			Sample Size	0	22	4	0
		F	Mean Length	507	540	528	
			Std. Error	3	4	13	
			Range	504- 509	483- 588	494- 565	
			Sample Size	2	33	5	0
	8/4-8, 13-15	M	Mean Length	543	565	582	
	(8/2 - 9/15)		Std. Error	13	4	12	
			Range	530- 556	458- 641	537- 626	
			Sample Size	2	76	9	0
		F	Mean Length	492	533	550	
			Std. Error	-	2	7	
			Range	492- 492	454- 654	516- 573	
			Sample Size	1	135	8	0
	Season	M	Mean Length	522	581	599	653
			Range	518- 556	458- 667	513- 687	624- 676
			Sample Size	3	264	131	2
		F	Mean Length	505	550	574	
			Range	492- 509	454- 654	494- 626	
			Sample Size	3	322	122	0
2002	6/24 - 27	M	Mean Length		594	612	603
	(6/15-29)		Std. Error		3	3	9
			Range		528- 665	536- 661	549- 645
			Sample Size	0	62	60	10
		F	Mean Length	527	580	597	592
			Std. Error	-	6	5	11
			Range	527- 527	520- 644	563- 658	566- 616
			Sample Size	1	23	18	4
	7/2 - 4	M	Mean Length		584	595	633
	(6/30-7/6)		Std. Error		4	7	-
			Range		525- 661	521- 685	633- 633
			Sample Size	0	61	34	1

-Continued-

Table 9. (page 6 of 7)

Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2 (3)	0.3 (4)	0.4 (5)	0.5 (6)
2002	7/2 - 4	F	Mean Length	549	554	568	578
(cont.)	(6/30-7/6)		Std. Error	11	4	4	-
	(cont.)		Range	521- 571	499- 654	530- 623	578- 578
			Sample Size	4	60	38	1
	7/9 - 11	M	Mean Length	582	586	605	594
	(7/7-13)		Std. Error	-	5	6	-
			Range	582- 582	522- 677	502- 673	594- 594
			Sample Size	1	47	43	1
		F	Mean Length	528	545	563	
			Std. Error	7	4	5	
			Range	495- 547	448- 610	516- 607	
			Sample Size	7	62	31	0
	7/16 - 18	M	Mean Length	548	587	605	
	(7/14-20)		Std. Error	9	4	7	
			Range	526- 578	497- 685	524- 677	
			Sample Size	6	58	33	0
		F	Mean Length	530	551	565	583
			Std. Error	11	3	5	-
			Range	466- 578	470- 605	508- 604	583- 583
			Sample Size	10	87	25	1
	7/23 - 26	M	Mean Length	536	573	594	594
	(7/21-28)		Std. Error	5	6	11	-
			Range	500- 591	402- 671	448- 684	594- 594
			Sample Size	18	53	28	1
		F	Mean Length	501	532	548	
			Std. Error	6	3	4	
			Range	449- 555	480- 614	505- 584	
			Sample Size	19	67	26	0
	7/30 - 8/1	M	Mean Length	537	559	569	
	(7/29-8/3)		Std. Error	6	4	9	
			Range	500- 592	507- 617	537- 616	
			Sample Size	20	43	9	0
		F	Mean Length	512	526	526	473
			Std. Error	4	4	6	-
			Range	452- 547	440- 691	480- 559	473- 473
			Sample Size	31	70	14	1
	8/5 - 8	M	Mean Length	526	553	564	
	(8/4-9/20)		Std. Error	5	5	15	
			Range	481- 562	501- 605	473- 618	
			Sample Size	26	24	9	0

-Continued-

Table 9. (page 7 of 7)

Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2 (3)	0.3 (4)	0.4 (5)	0.5 (6)
2002	8/5 - 8	F	Mean Length	499	517	548	
(cont.)	(8/4-9/20)		Std. Error	4	5	8	
	(cont.)		Range	411- 555	448- 606	497- 594	
			Sample Size	39	44	15	0
	Season	M	Mean Length	540	585	603	605
			Range	481- 592	402- 685	448- 685	549- 645
			Sample Size	71	348	216	13
		F	Mean Length	520	548	566	584
			Range	411- 578	440- 691	480- 658	473- 616
			Sample Size	111	413	167	7
2003	6/30 - 7/02	M	Mean Length	-	597	614	599
			Std. Error	-	5	27	14
			Range	-	523- 672	505- 689	584- 613
			Sample Size	0	37	6	2
		F	Mean Length	-	562	600	-
			Std. Error	-	10	-	-
			Range	-	513- 618	600- 600	-
			Sample Size	0	11	1	0
	Season	M	Mean Length	-	597	614	599
			Range	-	523- 672	505- 689	584- 613
			Sample Size	0	37	6	2
		F	Mean Length	-	562	600	-
			Range	-	513- 618	600- 600	-
			Sample Size	0	11	1	0
	Grand Total [c]	M	Mean Length	540	585	605	620
			Range	490- 590	423- 697	513- 687	581- 676
			Sample size	92	1087	589	17
		F	Mean Length	521	553	572	587
			Range	492- 560	454- 680	480- 675	590- 590
			Sample size	121	1338	501	9

[a] "Season" mean lengths are weighted by the escapement passage in each stratum.

[b] ASL composition of escapement was not estimated because of the premature termination of the project; results are excluded from the "Grand Total".

[c] "Grand Total" mean lengths are simple averages of the "Season" mean lengths.

FIGURES

Figure 1. Kuskokwim Area salmon management districts and escapement monitoring projects.

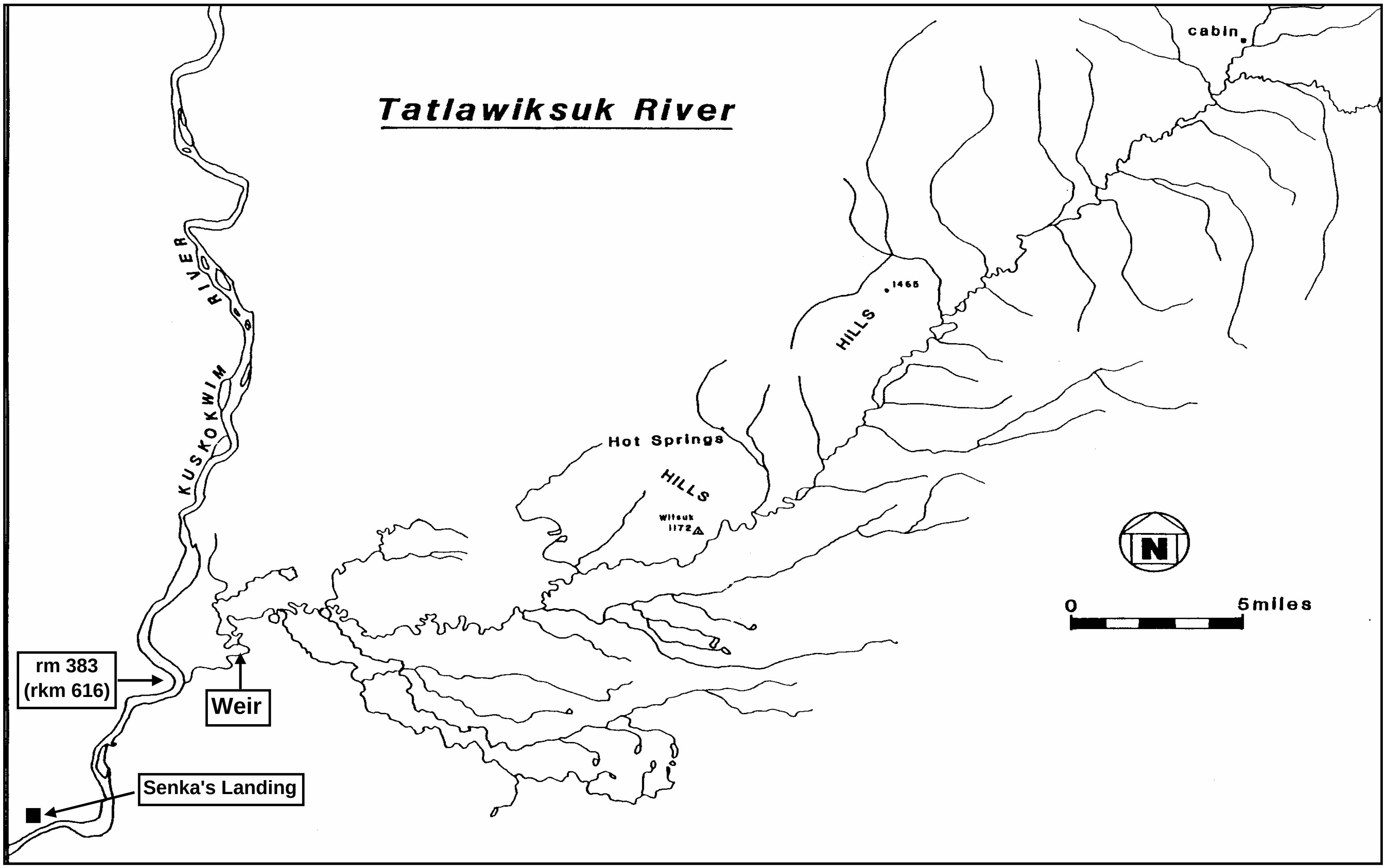


Figure 2. Tatlawiksuk River, middle Kuskokwim River basin.

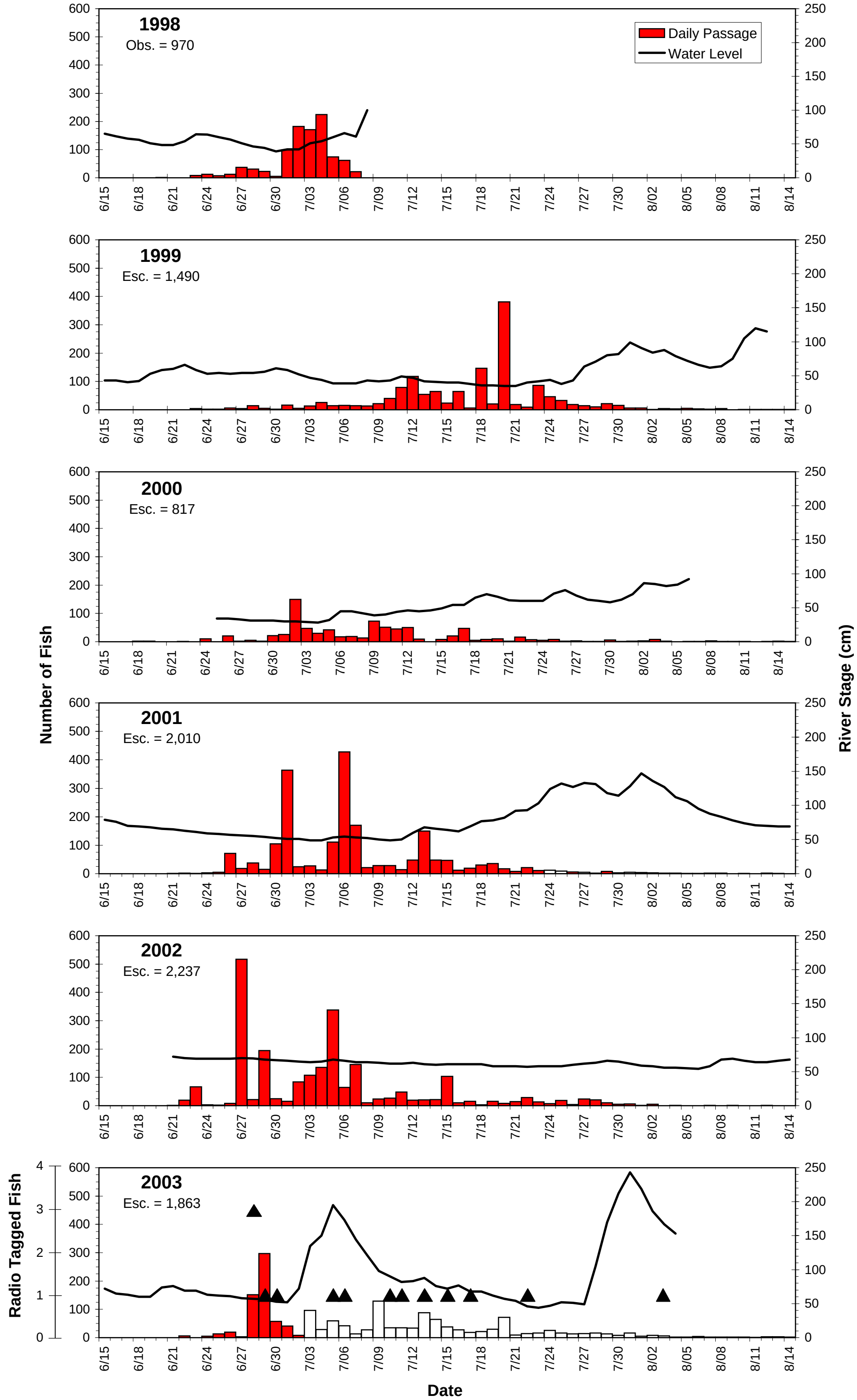


Figure 3. Daily chinook salmon passage relative to daily river stage at the Tatlawiksuk River weir, 1998 through 2003; and daily radio tagged chinook salmon passage at Tatlawiksuk River weir, 2003. Solid bars represent observed passage, open bars represent estimated passage.

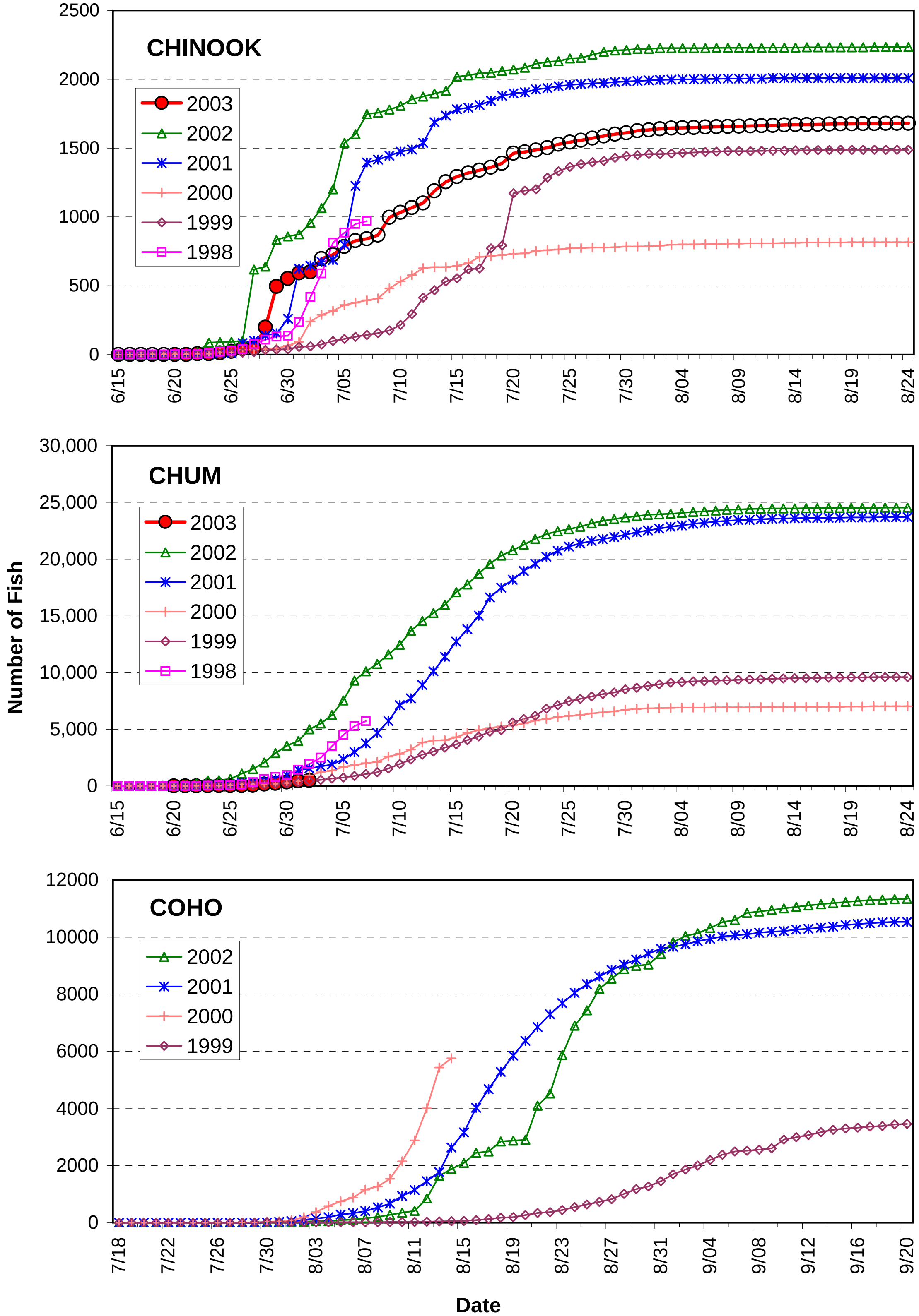


Figure 4. Historical cumulative passage of chinook, chum, and coho salmon at the Tatlawiksuk River weir.

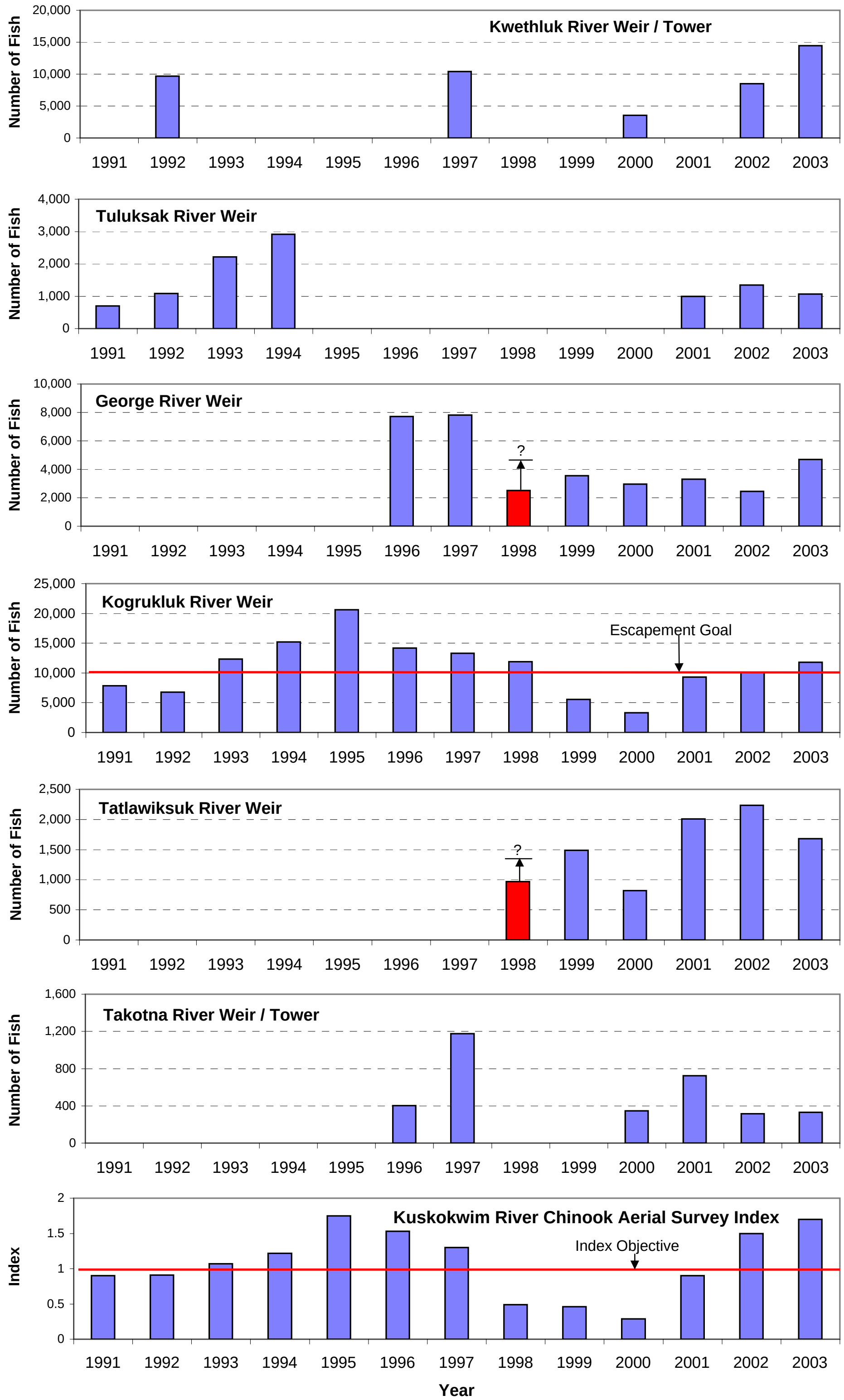


Figure 5. Chinook salmon escapement into six Kuskokwim River tributaries, and Kuskokwim River chinook salmon aerial survey indices, 1991 through 2003.

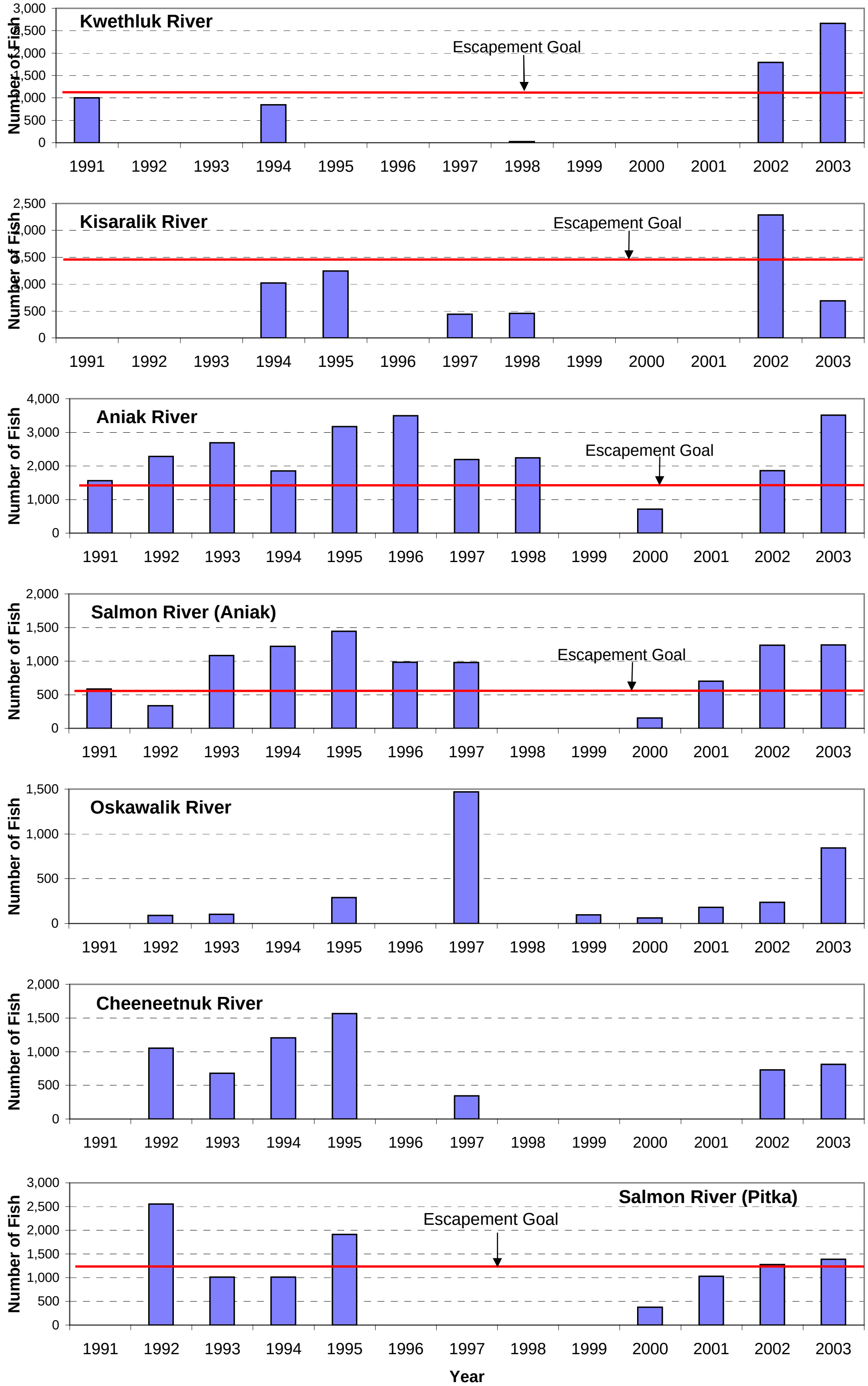


Figure 6. Aerial Survey Counts of Chinook Salmon in Seven Kuskokwim River tributaries, 1991 through 2003.

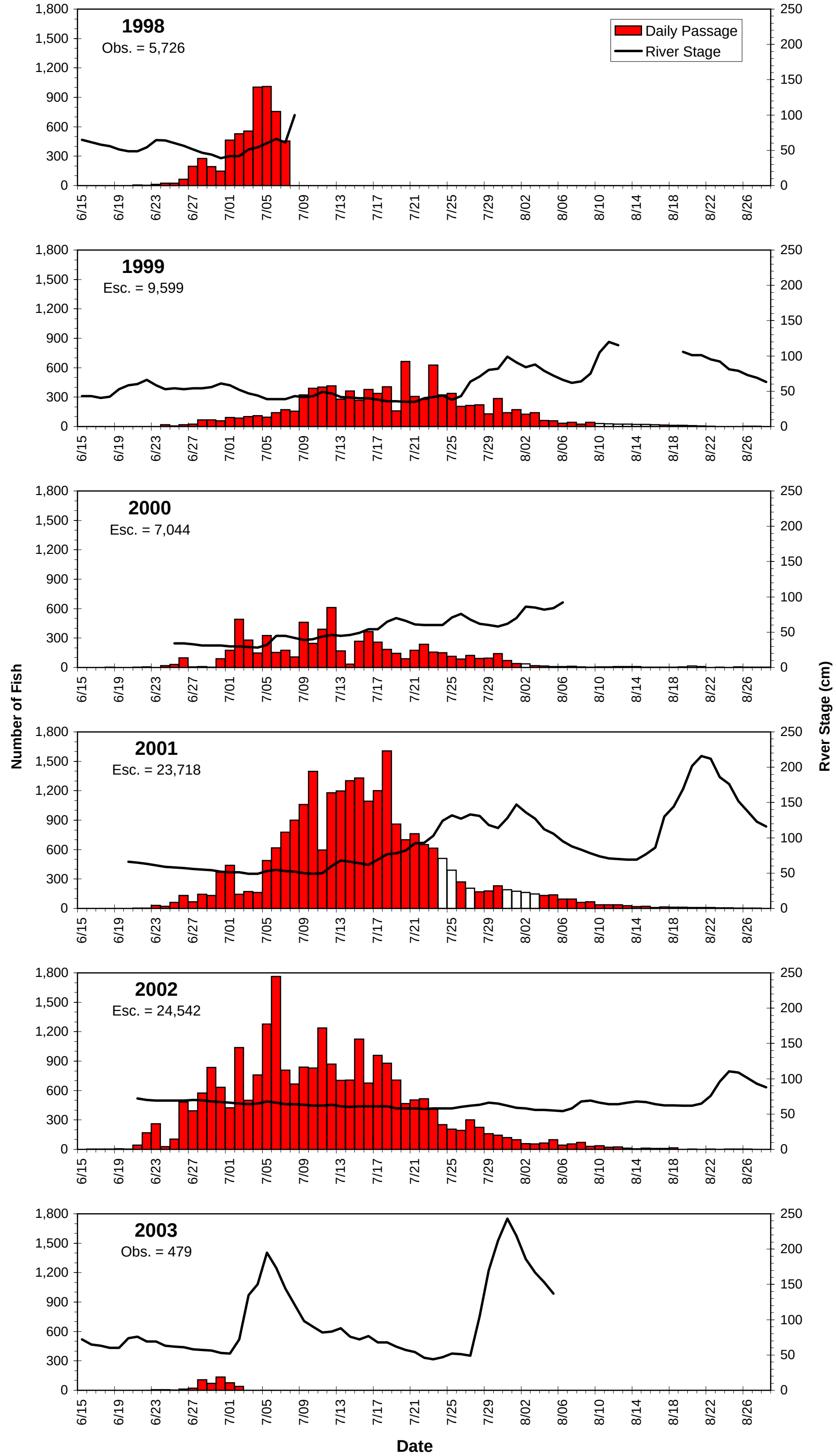


Figure 7. Daily chum salmon passage relative to daily river stage at the Tatlawiksuk River weir, 1998 through 2003. Solid bars represent observed passage, open bars represent estimated passage.

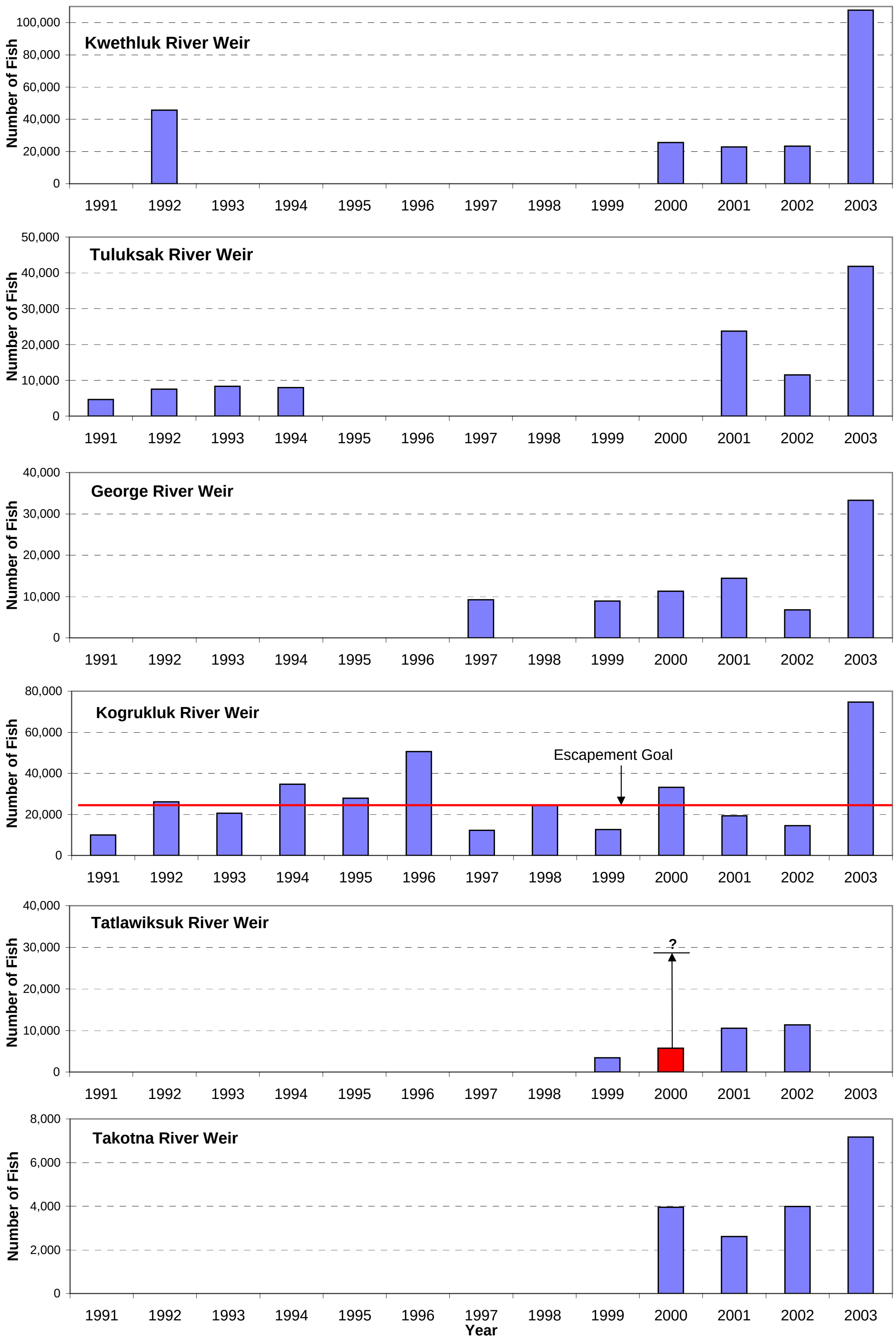


Figure 8. Coho salmon escapement into six Kuskokwim River tributaries, 1991 through 2003.

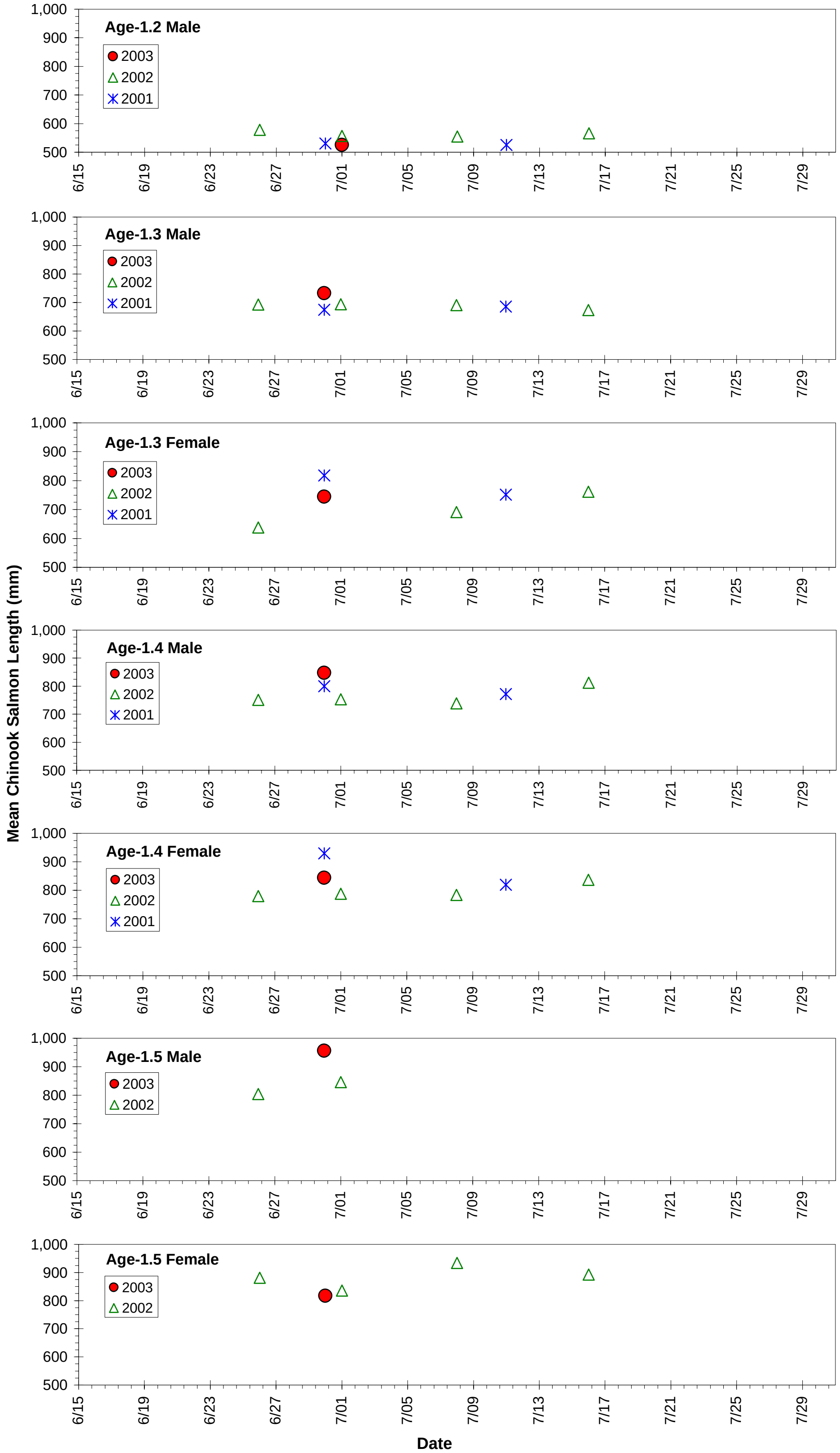


Figure 9. Mean length (mm) at age of chinook salmon by sample date at the Tatlawiksuk River weir, 2001 through 2003.

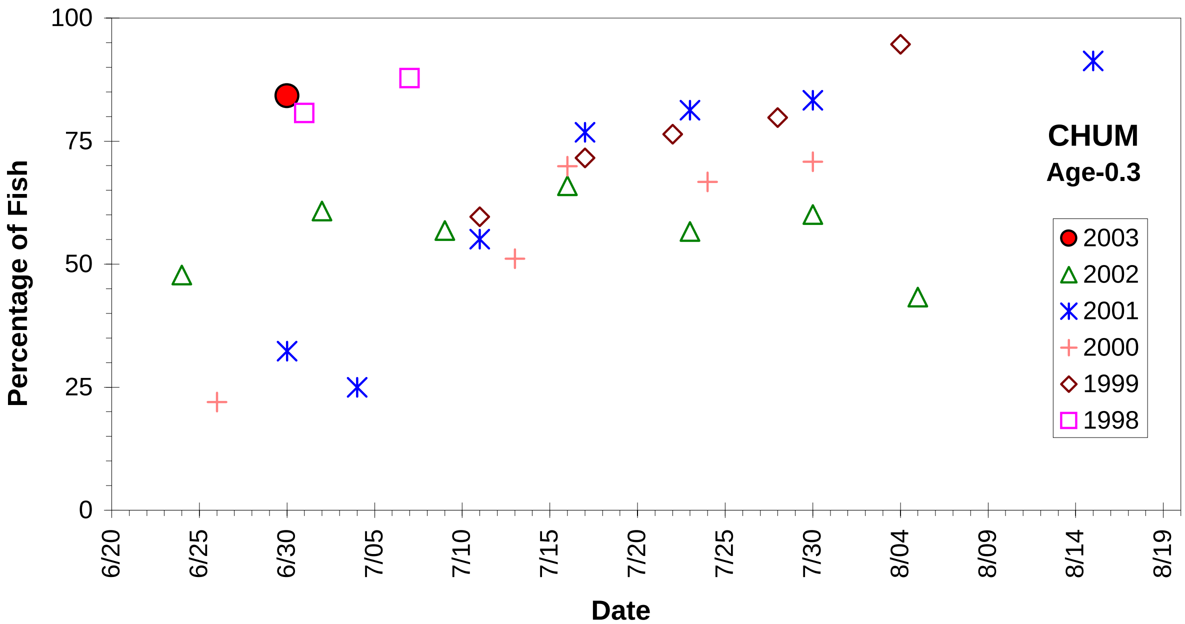


Figure 10. Percentage of age-0.3 chum salmon by sample date at the Tatlawiksuk River weir, 1998 through 2003.

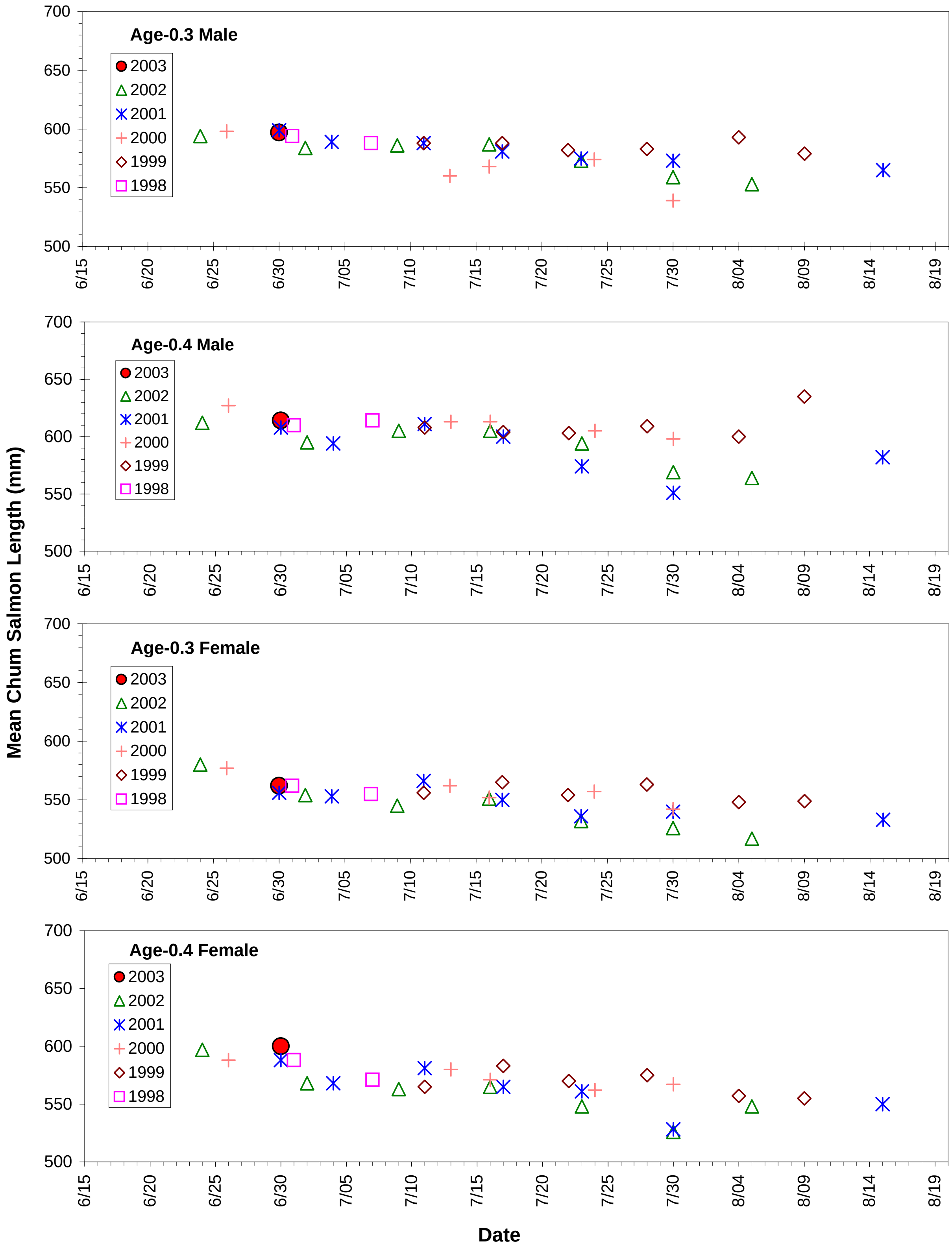


Figure 11. Average length (mm) at age of chum salmon by sample date at the Tatlawiksuk River weir, 1998 through 2003.

APPENDIX

APPENDIX A:
AERIAL SPAWNING GROUND SURVEY DATA
FROM KUSKOKWIM RIVER TRIBUTARIES

Appendix A.1. Peak aerial survey counts of chinook salmon in indexed Kuskokwim River spawning tributaries, 1975 through 2003[a].

	Kuskokwim River Tributary												
Year	Eek	Kwethluk Canyon C.	Kisaralik	Tuluksak	Aniak	Kipchuk (Aniak)	Salmon (Aniak)	Holokuk	Oskawalik	Holitna	Kogrukluk Weir	Cheeneetnuk	Salmon Pitka
1975			118			94		17	71	1,114			
1976				139		177		126	204	2,571	5,579	1,197	1,146
1977		2,290		291			562	60	276			1,399	1,978
1978	1,613	1,732	2,417	403			289			2,766	13,667	267	1,127
1979		911						113			11,338		699
1980	2,378			725			1,186	250	123				1,177
1981		1,783	672		9,074		894				16,655		1,474
1982	230				2,645		185	42	120	521	10,993		419
1983	188	471	731	129	1,909		231	33	52	1,069		243	586
1984		273	157	93	1,409					299	4,926	1,177	577
1985	1,118	629		135				135	61		4,619	1,002	625
1986					909		336	100		850	5,038	381	
1987	1,739	975		60		193	516	208	193	813		317	
1988	2,255	766	840	188	945		244	57	80		8,506		501
1989	1,042	1,157	152		1,880	994	631				11,940		446
1990	1,983	1,295	631	166	1,255	537	596	143	113		10,218		
1991	1,312	1,002		342	1,564	885	583				7,850		
1992					2,284	670	335	64	91	1,822	6,755	1,050	2,555
1993					2,687	1,248	1,082	114	103	1,573	12,332	678	1,012
1994		848	1,021		1,848	1,520	1,218				15,227	1,206	1,010
1995			1,243		3,174	1,215	1,442	181	289	2,787	20,630	1,565	1,911
1996					3,496		983	85			14,199		
1997			439	173	2,187	855	980	165	1,470	2,093	13,280	345	
1998		27	457		2,239	353							
1999								18	98	741	5,570		
2000					714	182	152	42	62	501	3,181		374
2001							703	51	186	1,760	9,294		1,029
2002		1,795	2,285		1,856	1,615	1,236	513	235	1,741	10,059	730	1,276
2003	1,236	2,661	688	94	3,514	1,493	1,242	1,096	844	1,477	11,771	810	1,391
BEG[b]		1,200	1,000	400	1,500		600			2,000	10,000		1,300
Median[c]	1,460					670		107	108			1,002	

[a] Estimates are from "peak" aerial surveys conducted between 20 and 31 July under fair, good, or excellent viewing conditions.

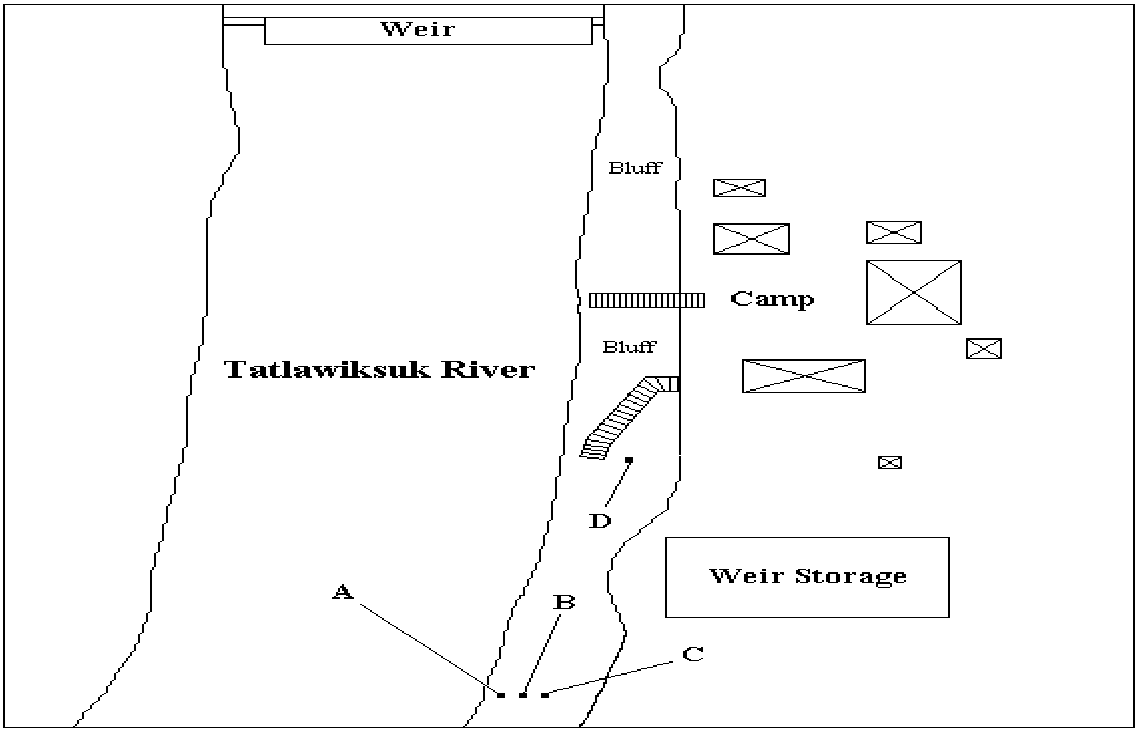
[b] From Buklis (1993).

[c] Median of years 1975 through 1994.

Appendix A.2. History of aerial spawning ground surveys of the Tatlawiksuk River drainage with surveyor comments.

Date of Survey	Observer	Survey Conditions	Species			Comments
			Chinook	Chum	Coho	
25-Jul-02	John Linderman	Fair	328	2,730	0	Overcast and tannic water obscured deeper pools in lower 10 mi. of survey
30 July 1997	Tom Cappiello	Poor	415	1,896	0	
28 July 1995	Charlie Burkey	Fair	249	976	0	15 miles along the middle river; water very brown, deep pools obscured. Chum count is low, could only survey top 4 miles of 101 due to dark water. Dark water and cloud cover hampered survey.
31 July 1994	Charlie Burkey	Fair	424	5,219	0	25 miles of middle and lower river; dark brown river bottom and water color. Overcast for part of survey. All decrease ability to see fish. Carcass count is a low estimate. 20-30 king redds without fish on them. Stopped survey 5 air miles from mouth due to dark water color.
28 July 1992	Charlie Burkey	Fair	235	2,400	0	30 miles of middle and lower river; water very dark with tannic acid; not a good river for aerial survey due to dark water
26 July 1987	Dan Scheiderhan	Poor	0	0	0	3 miles; too stained and turbid for survey; suveyed five miles in upper valley. North tributary about five miles from mouth is in similar condition
27 July 1982	Dan Scheiderhan	Poor				water high and muddy
07 August 1981	Dan Scheiderhan	Poor	35	48		40 miles of middle and lower river; foothills to 1,465 foot peak
20 July 1980	Rae Baxter					too stained; thousands of chum in tributary creek on south river
29 July 1978	Dan Scheiderhan	Poor	86	38	0	35 miles of middle and lower river; foothills to 1,465 foot peak; water with high dissolved organic material; dark coffee color makes visibility low
22 July 1977	Gary Schaefer	Poor	191	6,430	0	35 miles of middle and lower river; foothills to 1,465 foot peak lower 5 miles too turbid to survey; difficult to survey - very twisted and brown stained; counts minimal.
30 September 1976	Gary Schaefer	Fair	0	0	31	80 miles; Pete Shepards cabin to mouth
24 July 1976	Gary Schaefer	Fair	212	5,600	31	80 miles; Pete Shepards cabin to mouth
24 July 1968	Rae Baxter	Poor	58	3,000	0	35 miles; little good gravel

APPENDIX B: Tatlawiksuk River water level benchmark locations and descriptions.



A: Benchmark 1 – Set in 1999, representing a River stage of 70 cm. This benchmark was washed out as of September of 2000.

B: Benchmark 2 – Set in 1999, representing a river stage of 115 cm. This benchmark was washed out as of September 2000.

C: Benchmark 3 – Set in 1999, representing a river stage of 170 cm. This benchmark was still in place as of September 2001. The benchmark consists of two four foot long sections of ¾-in aluminum pipe, with the top three to four inches exposed above the gravel. One of the pipes was driven into the gravel horizontally, and one was driven vertically. This benchmark is located approximately 50-ft downstream of the weir storage area, and approximately 15-ft up the bank. Yellow or orange flagging tape was tied to the exposed portions of the pipe each year to aid in identification.

D: Benchmark 4 – Set in September 2001, representing a river stage of 204 cm. The benchmark consists of a five foot long section of 4-in aluminum pipe driven into the gravel with the top five inches exposed. A mark was scribed into the exposed portion of the pipe with a saw to denote the exact location of the river stage measurement. This benchmark is located approximately 10-ft downstream of the first set of stairs (cut into the bluff), and approximately 10-ft up the bank. Six sandbags were placed on top of the pipe to aid in identification, and for extra protection against damage.

APPENDIX C: Historical daily salmon carcasses passed downstream of Tatlawiksuk River weir.

Date	Chinook						Chum						Coho					
	1998	1999	2000	2001	2002	2003	1998	1999	2000	2001	2002	2003	1998	1999	2000	2001	2002	2003
6/15		0	0					0	0					0	0			
6/16		0	0					0	0					0	0			
6/17		0	0		0			0	0		0			0	0		0	
6/18	0	0	0		0		0	0	0		0		0	0	0		0	
6/19	0	0	0		0		0	0	0		0		0	0	0		0	
6/20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
6/25	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
6/26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/27	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
6/28	0	0	0	0	0	0	1	0	0	0	4	1	0	0	0	0	0	0
6/29	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0
6/30	0	0	0	0	1	0	1	0	0	0	3	0	0	0	0	0	0	0
7/01	0	0	0	0	0	0	3	1	1	3	3	0	0	0	0	0	0	0
7/02	0	0	0	0	0	1	1	1	1	3	3	1	0	0	0	0	0	0
7/03	0	0	0	0	0		1	0	0	3	6		0	0	0	0	0	
7/04	0	0	0	0	0		7	0	1	3	3		0	0	0	0	0	
7/05	0	0	1	0	0		3	0	0	0	6		0	0	0	0	0	
7/06	0	0	0	0	0		5	4	0	5	4		0	0	0	0	0	
7/07	0	0	0	0	0		13	0	1	1	4		0	0	0	0	0	
7/08		0	0	0	0			2	1	4	7			0	0	0	0	
7/09		0	0	0	0			11	0	5	11			0	0	0	0	
7/10		0	0	0	0			7	3	11	11			0	0	0	0	
7/11		0	0	0	0			5	8	6	15			0	0	0	0	
7/12		0	0	0	0			12	17	4	20			0	0	0	0	
7/13		0	0	0	0			0	11	5	30			0	0	0	0	
7/14		0	1	0	0			2	5	4	36			0	0	0	0	
7/15		0	0	0	0			4	9	3	19			0	0	0	0	
7/16		0	0	0	0			9	11	9	21			0	0	0	0	
7/17		0	0	0	0			11	8	3	38			0	0	0	0	
7/18		0	0	0	0			11	14	10	23			0	0	0	0	
7/19		0	0	0	0			4	12	0	47			0	0	0	0	
7/20		0	0	0	0			16	9	27	62			0	0	0	0	
7/21		0	0	0	1			12	10	38	33			0	0	0	0	
7/22		0	0	0	2			12	10	55	58			0	0	0	0	
7/23		0	0	1	0			17	15	63	66			0	0	0	0	
7/24		0	0	1	0			18	9	49	74			0	0		0	
7/25		0	0		0			11	11	71	53			0	0		0	
7/26		0	0	2	0			21	11	62	47			0	0	0	0	
7/27		0	0	2	3			32	11	65	38			0	0		0	
7/28		1	0	2	0			17	0	50	42			0	0	0	0	
7/29		1	0	0	1			19	14	49	31			0	0	0	0	
7/30		0	0	2	0			31	4	60	25			0	0	0	0	
7/31		1	1		0			43	15	57	61			0	0		0	
8/01		0	1		0			50	15		53			0	0		0	
8/02		2		2	0			10	15	35	44			0			0	
8/03		1	3	3	0			20	8	35	40			0	0		0	
8/04		2	2	0	0			59	12	37	40			0	0	0	0	
8/05		0	0	2	0			11	10	37	40			0	0	0	1	
8/06		4	0	1	0			23	0	63	39			0	0	0	0	
8/07		10	1	0	0			14	7	28	40			0	0	0	0	
8/08		3	1	1	0			25	4	36	21			0	0	0	0	
8/09		11	0	0	0			49	0	20	20			0	0	0	0	
8/10			0	0	0			11	0	36	9				0	0	0	
8/11			0	0	1				0	15	4				0	0	0	
8/12			0	0	0				0	22	7				0	0	0	
8/13			0	0	0				0	27	7				0	0	0	
8/14			0	0	0				0	18	6				0	0	0	
8/15				0	0					4	3					0	0	
8/16				0	0					22	9					0	0	
8/17					0					8	5						0	
8/18					0					4	2						0	
8/19					0			2			4						0	
8/20					0					1	0						0	
8/21					0						1						0	
8/22					1						2						0	
8/23					0			1			0						0	
8/24		0			0			3			0			0			0	
8/25		1			0			0			0			0			0	

-Continued-

APPENDIX C: (page 2 of 2)

Date	Chinook						Chum						Coho					
	1998	1999	2000	2001	2002	2003	1998	1999	2000	2001	2002	2003	1998	1999	2000	2001	2002	2003
8/26		0			0			0			0			0			0	
8/27		0			0			0			0			0			0	
8/28		0		0	0			0		0	0			0		0	0	
8/29		0		0	0			0		1	0			0		0	0	
8/30		0		0	0			0		1	0			1		0	0	
8/31		0		0	0			0		0	0			0		1	0	
9/01		0		0	0			0		0	1			0		0	0	
9/02		0		1	0			0		0	0			0		0	0	
9/03		0		0	0			0		0	0			0		0	1	
9/04		0		0	0			0		0	0			0		0	0	
9/05		0		0	0			0		0	0			0		0	0	
9/06		0		0	0			0		0	0			0		0	0	
9/07		0		0	0			0		1	0			0		0	0	
9/08		0		0	0			0		0	0			0		0	0	
9/09		0		0	0			0		0	0			1		0	0	
9/10		0		0	0			0		0	0			0		0	0	
9/11		0		0	0			0		0	0			0		2	0	
9/12		0		0	0			0		0	0			0		0	0	
9/13		0		0				0		0				1		0		
9/14		0		0				0		0				0		1		
9/15		0		0				0		0				0		0		
9/16		0						0						0				
9/17		0						0						0				
9/18		0						0						0				
9/19		0						0						0				
9/20		0						0						0			2	
Carcass Total	0	37	11	20	10	1	36	611	293	1180	1304	3	0	3	0	4	4	0
Live Passage	970	1,490	817	2,010	2,237	1,683	5,726	9,599	7,044	23,718	24,542	479	0	3,455	5,756	10,539	11,345	0
% of Live Passage	0.0	2.5	1.3	1.0	0.4	0.1	0.6	6.4	4.2	5.0	5.3	0.6	n.a	0.1	0.0	0.0	0.0	n.a

= Weir was not operational

APPENDIX D. Daily water conditions and weather at Tatlawiksuk River weir, 2003.

Date	Observation Time	Sky [a] (a.m.)	Precip. [b] (a.m.)	Wind Vel. (knotts)	Temperature (°C) Air	Water	Water Level (cm)	
6/10	10:30	4	0	SW 0-5				
6/11	7:30	4	0	0	11	7		
6/12	7:30	1	0	NE 0-5	13	7	88	
6/13	7:30	1	0	NE 5-20	15	7	89	
6/14	7:30	1	0	W 0-10	13	7	80	
6/15	7:30	1	0	0	10	7	72	
6/16	7:30	4	0	0	12	7	65	
6/17	7:30	1	0	0	8	6	63	
6/18	7:30	2	0	0	8	10	60	
6/19	7:30	4	B	0	10	7	60	
6/20	7:30	3	A	0	11	7	74	
6/21	7:30	4	A	0	11	7	76	
6/22	7:30	4	0	0	10	7	69	
6/23	7:30	1	0	0	13	7	69	
6/24	7:30	1	A	0	8	7	63	
6/25	7:30	4	0	0	11	10	62	
6/26	7:30	3	0	0	7	7	61	
6/27	7:30	4	0	0	8	7	58	
6/28	7:30	1	0	0	8	7	57	
6/29	7:30	4	0	NW 0-5	14	7	56.5	
6/30	7:30	4	0	0	14	8	53	
7/1	7:30	4	A	SW 0-5	15	6	52	
7/2	7:30	4	B	0	11	6	72	
7/3	7:30	4	B	SW 0-5	10	6	135	*
7/4	10:30	3	0	SW 0-5	17	8	150	*
7/5	7:30	4	A	0	14	6	195	*
7/6	7:30	4	A	0	13	10	173	*
7/7	7:30	1	0	0	14	10	144	
7/8	7:30	1	0	0	18	11	121	
7/9	7:30	4	A	0	14	9	98	
7/10	7:30	4	A	S 0-10	12	9	90	
7/11	7:30	4	0	0	12	9	82	
7/12	7:30	1	0	0	13	9	83	
7/13	7:30	1	0	0	13	9	88	
7/14	7:30	3	0	0	17	10	76	
7/15	7:30	4	0	0	16	10	72	
7/16	7:30	4	A	W 0-5	10	9	77	
7/17	7:30	1	A	0	5	6	68	
7/18	7:30	1	A	0	5	6	68	
7/19	7:30	1	0	0	13	6.5	62	
7/20	7:30	1	0	NE 0-5	18	9	57	
7/21	7:30	1	0	0	13	9	54	
7/22	7:30	4	0	0	13	9	46	
7/23	7:30	4	0	NE 5-15	15	11	44	
7/24	7:30	4	A	0	12	8	47	

-Continued-

APPENDIX D. (page 2 of 2)

Date	Observation Time	Sky [a] (a.m.)	Precip. [b] (a.m.)	Wind Vel. (knotts)	Temperature (^oC) Air	Water	Water Level (cm)
7/25	7:30	4	A	0	11	8	52
7/26	7:30	4	A	W 0-5	12	9	51
7/27	7:30	4	A	SW 5-10	13	9	49
7/28	7:30	4	B	0	9	9	105
7/29	7:30	3	A	0	13	9.5	170
7/30	7:30	4	A	0	11	10	212
7/31	7:30	1	0	0	8	9	243
8/1	7:30	3	0	0	8	6	219
8/2	7:30	4	0	0	9	8	186
8/3	7:30	4	0	W 5	10	9	167
8/4	7:30	5	0	0	5	8	153
8/5	7:30	2	0	0	3	9	137

a Sky condition codes:

0 = no observation
1 = < 1/10 cloud cover
2 = partly cloudy; < 1/2 cloud cover
3 = mostly cloudy; > 1/2 cloud cover
4 = complete overcast
5 = thick fog

b Precipitation Codes:

A = intermittaent rain
B = continuous rain
C = snow
D = snow and rain
E = hail
F = thunder

c = Estimated water level.